

# Stormwater Division

## MEMORANDUM

**DATE:** March 11, 2010  
**TO:** Michael J. Gillis, Virginia Correctional Enterprises Document Management Services  
**FROM:** Jo Anna Ripley, Stormwater  
**PO:** 270712  
**RE:** Files Approved for Scanning

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**General File ID or BMP ID:** PC203

**PIN:** 3831800001

**Subdivision, Tract, Business or Owner**

**Name (if known):**

News Company LLC

**Property Description:**

Windsormeade Marketplace

**Site Address:**

4900 Monticello Ave

*(For internal use only)*

**Box** 18

**Drawer:** N/A

**Agreements: (in file as of scan date)**

**Y**

**Book or Doc#:**

040021396

**Page:**

809

797

Comments

PRINTED ON

Thursday, March 11, 2010

2:57:29 PM

WATERSHED

PC

BMP ID NO

203

PLAN NO

SP-150-03

TAX PARCEL

(38-3)(1-2)(38-4)

PIN NO

3831800001

CONSTRUCTION DATE

5/3/2006

PROJECT NAME

WindsorMeade Marketplace

FACILITY LOCATION

4900 Monticello Ave & Windsor Meade Way

CITY-STATE

Williamsburg, VA

CURRENT OWNER

SLN Williamsburg Associates, LCC

OWNER ADDRESS

9211 Forest Hill Ave

OWNER ADDRESS 2

Suite 110

CITY-STATE-ZIP CODE

23235

OWNER PHONE

804-320-7600

MAINT AGREEMENT

Yes

EMERG ACTION PLAN

No

Get Last BMP No

Return to Menu

MAINTENANCE PLAN	Yes	CTRL STRUC DESC	RCP Riser
SITE AREA acre	31.44	CTRL STRUC SIZE inches	48
LAND USE	Commercial Retail	OTLT BARRL DESC	RCP
old BMP TYP	Wet Pond	OTLT BARRL SIZE inch	36
JCC BMP CODE	A3 Wet ED Pond		
POINT VALUE	10	EMERG SPILLWAY	Yes

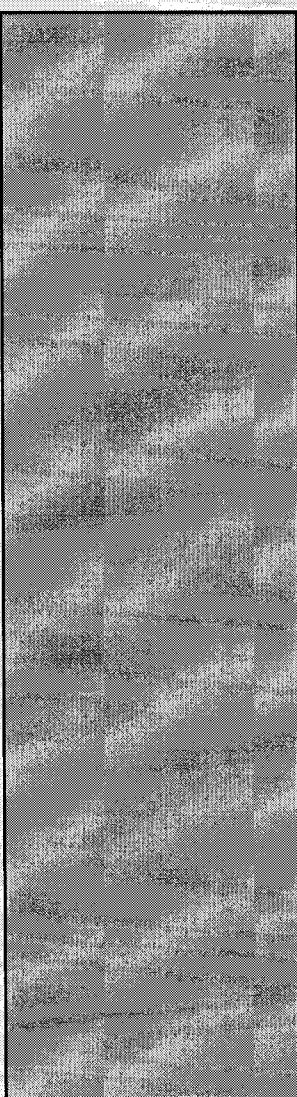
SVC DRAIN AREA acres	20.9	DESIGN HW ELEV	83.70
		PERM POOL ELEV	77.45
		2-YR OUTFLOW cfs	0.35
		10-YR OUTFLOW cfs	25.80

RECV STREAM	Powhatan Creek Watershed	REC DRAWING	Yes
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SERVICE AREA DESCRI	Parking Lot and green space		
IMPERV AREA acres	15.53	CONSTR CERTIF	Yes

EXT DET-WQ-CTRL	No	LAST INSP DATE	11/5/2007	Inspected by:	
WTR QUAL VOL acre-ft		INTERNAL RATING	4		
CHAN PROT CTRL	No	MISC/COMMENTS			
CHAN PROT VOL acre-ft		BMP #1.			
SW/FLOOD CONTROL	No				
GEOTECH REPORT	Yes				

Additional Comments:



 **COPY**

COUNTY OF JAMES CITY, VIRGINIA

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

THIS DECLARATION, made this 11<sup>th</sup> day of AUGUST, 2004  
between C.C. CASEY LIMITED COMPANY, a Virginia limited liability company, and all  
successors in interest ("COVENANTOR(S)"), owner(s) of the following property: Intersection of  
WindsorMeade Way & Monticello Avenue - 4800 thru 4970 Monticello Ave.  
Street Address: preliminary addresses established for WindsorMeade Marketplace  
Legal Description: New Town West - See attached Exhibit "A" (the "Property")  
Project Name: WindsorMeade Marketplace, Site Plan JCC #SP-150-03 dated 7-9-04 (the "Plan")  
Document No.: see Exhibit "A", Deed Book: see Exhibit "A", Page No.: see Exhibit "A"  
Instrument No.: see Exhibit "A", and the County of James City, Virginia ("COUNTY").

WITNESSETH:

We, the COVENANTOR(S), with full authority to execute deeds, mortgages, other  
covenants, and all rights, titles and interests in the property described above, do hereby covenant  
with the COUNTY as follows:

1. The COVENANTOR(S) shall provide maintenance for the drainage system shown  
on the Plan, including any runoff control facilities, conveyance systems and associated easements,  
hereinafter referred to as the "SYSTEM," located on and serving the above-described property to  
ensure that the SYSTEM is and remains in proper working condition in accordance with approved  
design standards, and with the law and applicable executive regulations. The SYSTEM shall not  
include any elements located within any Virginia Department of Transportation rights-of-way.
2. If necessary, the COVENANTOR(S) shall levy regular or special assessments  
against all present or subsequent owners of property served by the SYSTEM to ensure that the  
SYSTEM is properly maintained.
3. The COVENANTOR(S) shall provide and maintain perpetual access from public  
right-of-ways to the SYSTEM for the COUNTY, its agent and its contractor.
4. The COVENANTOR(S) shall grant the COUNTY, its agent and its contractor a  
right of entry to the SYSTEM for the purpose of inspecting, operating, installing, constructing,  
reconstructing, maintaining or repairing the SYSTEM.
5. If, after reasonable notice by the COUNTY, the COVENANTOR(S) shall fail to  
maintain the SYSTEM in accordance with the approved design standards and with the law and  
applicable executive regulations, the COUNTY may perform all necessary repair or maintenance  
work, and the COUNTY may assess the COVENANTOR(S) and/or all property served by the  
SYSTEM for the cost of the work and any applicable penalties.

6. The COVENANTOR(S) shall indemnify and save the COUNTY harmless from any and all claims for damages to persons or property arising from the installation, construction, maintenance, repair, operation or use of the SYSTEM.

7. The COVENANTOR(s) shall promptly notify the COUNTY when the COVENANTOR(s) legally transfers any of the COVENANTOR(s) responsibilities for the SYSTEM. The COVENANTOR(s) shall supply the COUNTY with a copy of any document of transfer, executed by both parties. COVENANTOR(s) contemplate conveying the Property to SLN Casey Associates, L.L.C. (the "Shopping Center Owner"), the developer of the shopping center to be built per the Plan, on which the SYSTEM is to be constructed. Anything herein to the contrary notwithstanding, in the event that the COVENANTOR(s) provides the COUNTY with a deed conveying to the Shopping Center Owner the Property, which deed is executed by both COVENANTOR(s) and the Shopping Center Owner and confirms the assumption of the maintenance responsibilities for the SYSTEM by the Shopping Center Owner, COVENANTOR(s) and its successors and assigns (other than the Shopping Center Owner and the Shopping Center Owner's successors in title to the Property), shall be released from any liabilities and obligations under this Declaration which accrue subsequent to the assumption by the Shopping Center Owner of the maintenance responsibilities of the SYSTEM.

8. The covenants contained herein shall run with the land and shall bind the COVENANTOR(S) and the COVENANTOR(S)' heirs, executors, administrators, successors and assignees, and shall bind all present and subsequent owners of property served by the SYSTEM.

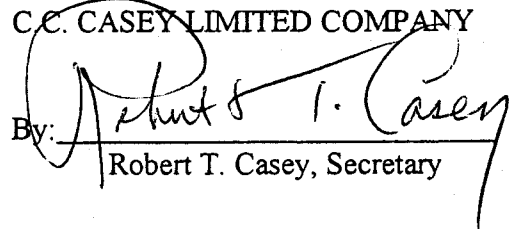
9. This COVENANT shall be recorded in the County Land Records.

IN WITNESS WHEREOF, the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of the date first above written.

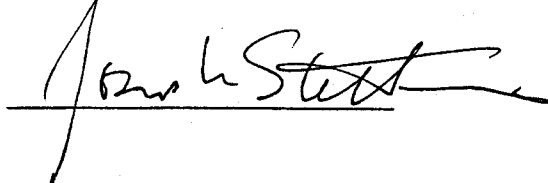
COVENANTOR(S)

C.C. CASEY LIMITED COMPANY

By:

  
Robert T. Casey, Secretary

ATTEST:





COMMONWEALTH OF VIRGINIA

CITY/COUNTY OF James City

I hereby certify that on this 11<sup>th</sup> day of August, 2004, before the subscribed, a Notary Public of the State of Virginia, and for the City/County of James City, aforesaid personally appeared Robert T. Casey, Secretary of C.C. Casey Limited Company and did acknowledge the foregoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 11<sup>th</sup> day of August, 2004

Roseanna C. Dykstra  
Notary Public

My Commission expires: My Commission Expires April 30, 2005

Approved as to form:

Lee P. Rogers  
County Attorney

This Declaration of Covenants prepared by:

James M. Gresock  
Senior Vice President  
S.L. Nusbaum Realty Co.  
9211 Forest Hill Avenue, Suite 110  
Richmond, VA 23235  
804/320-7600

drainage.pre

## EXHIBIT A

### Description of the Property

All those certain lots, parcels or tracts of land, situate and lying in the Powhatan District of James City County, Virginia, containing a total of 34.48 acres more or less and being the same properties designated as a portion of James City County Tax Map Parcels #(38-3)(1-2), #(38-3)(1-5), #(38-3)(1-6), (38-3)(1-7), #(38-3)(1-8), and a Portion of Tax Map Parcel #(38-3)(1-34);

Said parcels are more particularly described by metes and bounds as follows:

**All of James City County Tax Map Parcels #(38-3)(1-2), #(38-3)(1-5), #(38-3)(1-6), (38-3)(1-7), #(38-3)(1-8) and a Portion of Tax Map Parcel #(38-3)(1-34) Owned by C. C. Casey Limited Company:**

Beginning at a point on the northerly right-of-way line of Monticello Avenue Extended, State Route #321, said point being S28°41'04"W, 358.65' from the intersection of the westerly right-of-way line of State Route #199 and the northerly right-of-way line of said Monticello Avenue Extended, State Route #321, a corner to the property described hereon and the property now or formerly standing in the name of the Commonwealth of Virginia; thence leaving said corner of the property now or formerly standing in the name of the Commonwealth of Virginia and lying along the right-of-way line of Monticello Avenue Extended, State Route #321, S46°23'51"W, 530.33' to a point; thence along a curve to the right, having a radius of 869.93' and an arc length of 91.40' to a point; said point being at the intersection of the northerly right-of-way line of said Monticello Avenue Extended, State Route #321 and the easterly right-of-way line of what is now known as Old News Road; thence leaving said right-of-way line of Monticello Avenue Extended, State Route #321 and lying along the easterly right-of-way line of what is now known as Old News Road, N34°54'22"W, 480.33' to a point; thence N33°17'29"W, 275.90' to a point; thence along a curve to the left, having a radius of 400.00' and an arc length of 62.99' to a point; thence N42°18'49"W, 9.79' to a point; thence along a curve to the left, having a radius of 251.53' and an arc length of 40.04' to a point; said point being a corner to the properties described hereon and the remaining portion of James City Tax Map Parcel #(38-3)(1-34) now or formerly standing in the name of C. C. Casey Limited Company; thence along the line of the remaining portion of James City Tax Map Parcel #(38-3)(1-34) now or formerly owned by C. C. Casey Limited Company and an existing 40' private right-of-way, N43°12'19"E, 178.71' to a point; thence leaving said 40' private right-of-way and continuing along the line of the remaining portion of James City County Tax Map Parcel #(38-3)(1-34), now or formerly owned by C. C. Casey Limited Company, N36°30'08"W, 123.42' to a point; thence along a curve to the right, having a radius of 790.50' and an arc length of 214.79' to a point; thence along a curve to the right, having a radius of 587.50' and an arc length of 101.13' to a point; thence N11°04'18"W, 34.77' to a point; thence along a curve to the right, having a radius of 787.50' and an arc length of 246.68' to a point; thence along a curve to the right, having a radius of 1387.50' and an arc length of 46.69' to a point; thence N89°13'21"E, 746.48' to a point; thence N63°40'56"E, 565.00' to a point on the westerly right-of-way line of State Route #199, a corner to the properties described hereon and the remaining portion of James City County Tax Map Parcel #(38-3)(1-34) now or formerly owned by C. C. Casey Limited Company; thence leaving said corner

of the remaining portion of James City Tax Map Parcel #(38-3)(1-34) now or formerly standing in the name of C. C. Casey Limited Company and lying along the westerly right-of-way line of State Route #199, S08°18'36"E, 171.61' to a point; thence S04°50'02"W, 654.04' to a point; thence along a curve to the left, having a radius of 903.51' and an arc length of 235.65' to a point, said point being a corner to the property described hereon, the property now or formerly standing in the name of the Commonwealth of Virginia and the intersection of the right-of-way line State Route #199 and Monticello Avenue Extended, State Route #321; thence along the line of the property now or formerly owned by the Commonwealth of Virginia, S28°41'04"W, 358.65' to the aforesaid point of beginning. The properties described above contain an aggregate area of 34.13 acres more or less.

And the following parcel:

Beginning at a point at the intersection of the westerly right-of-way line of State Route #199 and the northerly right-of-way line of Monticello Avenue Extended, State Route #321; thence lying along the northerly right-of-way line of said Monticello Avenue Extended, State Route #321, S46°23'51"W, 276.71' to a point, a corner to the property described hereon and the properties now or formerly owned by C. C. Casey Limited Company; thence leaving said corner of the properties now or formerly owned by C. C. Casey Limited Company and lying along the property owned by the Commonwealth of Virginia, N28°41'04"E, 358.65' to a point, said point being on the westerly right-of-way line of State Route #199; thence lying along the westerly right-of-way line of State Route #199, S13°36'06"E, 71.92' to the aforesaid point of beginning. The property described hereon contains an area of 0.35 acres more or less.



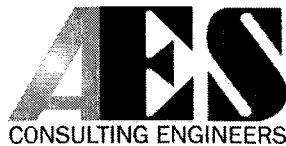
**Windsormeade Marketplace**  
**James City County Environmental**

December 29, 2003

**SP-150-03**  
**1ST SUB**

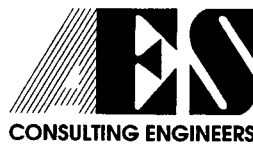


Prepared by:



**AES Consulting Engineers**  
5248 Olde Towne Road, Suite 1  
Williamsburg, VA 23188  
(757) 253-0040 Fax: (757) 220-8994  
<http://www.aesva.com>

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614 Moorefield Park Drive  
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(804) 330-8040 • Fax (804) 330-9840

December 23, 2003

Mr. Scott Thomas  
Environmental Division Director  
James City County  
P.O. Box 8784, Building E  
Williamsburg, Virginia 23187

**RE: Windsormeade Marketplace  
AES Project No. 9069**

Dear Mr. Thomas:

AES Consulting Engineers, on behalf of SLN Williamsburg, LLC, respectfully requests an exception from the Director of the Environmental Division for the James City County 10 point Environmental requirement. Included with this report is a James City County BMP worksheet indicating that we are able to obtain 9.75 points for the conditions of our site.

The 10 point extended wet pond (BMP #1) located behind the shopping center is designed to treat all of the impervious area that we are developing with these plans east of Windsormeade Way. The limits of the site extend to parcels between Windsormeade Way and News Road. Most of the drainage from these parcels is treated in BMP's submitted with Windsormeade Way plans.

We appreciate your help with this matter and hope you will not hesitate to call if you have any further questions.

Sincerely,

AES Consulting Engineers

*Bryan W. Stevenson* NPC

Bryan W. Stevenson  
Project Engineer

**NOT  
NECESSARY.**

SITE 31.44AC

Table 2

## Worksheet for BMP Point System

## A. STRUCTURAL BMP POINT ALLOCATION

BMP	BMP Points		Fraction of Site Served by BMP		Weighted BMP Points
#11 - WET ED	10	x	20.90/31.44	=	6.65
		x		=	
		x		=	
		x		=	

TOTAL WEIGHTED STRUCTURAL BMP POINTS: 6.65

## B. NATURAL OPEN SPACE CREDIT

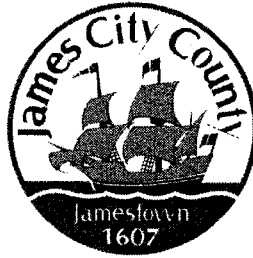
Fraction of Site		Natural Open Space Credit		Points for Natural Open Space
1.24 / 31.44 = 3.94%	x	.1	=	0.39
		(0.1 per 1%)		
5.69 / 31.44 = 18.10%	x	.15	=	2.72
		(0.15 per 1%)		

TOTAL NATURAL OPEN SPACE CREDIT: 3.11

## C. TOTAL WEIGHTED POINTS

<u>6.65</u>	+	<u>3.11</u>	=	<u>9.76</u>
Structural BMP Points		Natural Open Space Points		Total





James City County, Virginia  
Environmental Division

**Erosion and Sediment Control and  
Stormwater Management Design Plan Checklists**

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GENERAL INFORMATION

Project Name: Windsormeade Marketplace

Owner / Applicant: AES

Plan Preparer: Arch Marston Email: amarston@aesva.com

Project Location: Intersection of Monticello and Windsormeade Way Roads

Tax Map / Parcel: \_\_\_\_\_

County Plan No. (if known): \_\_\_\_\_

County BMP Type: \_\_\_\_\_ ( \_\_\_\_\_ - \_\_\_\_\_ )

Other information submitted in addition to this checklist (Check all that apply):

- ☒ Design or Construction Drawings (Plans, Profiles, Details, etc.).
- ☒ Erosion & Sediment Control Plan (Plan, Details, etc.).
- ☐ Erosion & Sediment Control Plan Design Report.
- ☒ Stormwater Management Design Plan (Plans, Profiles, Details, etc.).
- ☒ Stormwater Management Design Report.
- ☐ Other, List: \_\_\_\_\_

*Issue Date*  
*March 1, 2001*

**JAMES CITY COUNTY, VIRGINIA  
ENVIRONMENTAL DIVISION**

***EROSION AND SEDIMENT CONTROL PLAN CHECKLIST***

**I. GENERAL:**

**Yes No N/A**

☒ ☐ ☐

*FAMILIARITY* with current versions of Chapter 8, Erosion and Sedimentation Control and Chapter 23, Chesapeake Bay Preservation ordinances of the Code of James City County, Virginia and the Virginia Erosion and Sediment Control Handbook (VESCH).

☐ ☐ ☒

*LAND DISTURBING PERMIT AND SILTATION AGREEMENT* with surety are required for the project.

☐ ☐ ☒

*VARIANCE* if necessary, requested in writing, for the plan approving authority to waive or modify any of the minimum standards and specifications of the VESCH deemed inappropriate based on site conditions specific to this review case only. Variances which are approved shall be properly documented in the plan and become part of the approved erosion and sediment control plan for the site.

**II. SITE PLAN:**

**Yes No N/A**

☒ ☐ ☐

*VICINITY MAP* locating the site in relation to the surrounding area. Include any major landmarks which might assist in physically locating the site.

☒ ☐ ☐

*INDICATE NORTH* direction in relation to the site.

☒ ☐ ☐

*LIMITS OF CLEARING AND GRADING* for the site including that required for implementation of erosion and sediment controls, stockpile areas and utilities.

☒ ☐ ☐

*DISTURBED AREA ESTIMATES* in acres or square feet for the project.

☒ ☐ ☐

*EXISTING TOPOGRAPHY* or contours for the site at no more than 5 foot contour interval.

☒ ☐ ☐

*FINAL TOPOGRAPHY*, contours or proposed site grading in accordance with the design plan which indicates changes to existing topography and drainage patterns at no more than 2 foot contour interval (or 1 foot contours where required).

☒ ☐ ☐

*EXISTING AND PROPOSED SPOT ELEVATIONS* to supplement existing and proposed contours, topography or site grading information. Spot elevations may replace final contours in some instances, especially if terrain is in a low lying area or relatively flat.

☐ ☐ ☒

*EXISTING VEGETATION* including existing tree lines, grassed or unique vegetation areas.

Yes No N/A

☒ ☐ ☐

*EXISTING SITE FEATURES* including roads, buildings, homes, utilities, streams, fences, structures and other important surface features of the site.

☒ ☐ ☐

*SOILS MAP* with soil symbols, boundaries and legend in accordance with the current Soil Survey of James City and York Counties and the City of Williamsburg, Virginia.

☒ ☐ ☐

*ENVIRONMENTAL INVENTORY* in accordance with Section 23-10(2) of the Chesapeake Bay Preservation Ordinance of James City County. Inventory generally includes: tidal shores and wetlands, non-tidal wetlands, resource protection area, hydric soils and slopes steeper than 25 percent. For wetlands, provide a copy of issued permits or satisfactory evidence that appropriate permits are being pursued for the entire project.

☐ ☐ ☒

*100-YEAR FLOODPLAIN LIMITS* or any special flood hazard areas or flood zones based on appropriate Federal Management Agency Flood Insurance Rate Maps (FIRMs) or Flood Hazard Boundary Maps (FHBMs) of James City County, Virginia.

☒ ☐ ☐

*DRAINAGE AREAS* for offsite and onsite areas, existing or proposed as applicable. Include drainage divides and directional labels for all subareas at points of interest and size (in acres), weighted runoff coefficient or curve number and times of concentration for each subarea.

☐ ☐ ☒

*CRITICAL EROSION AREAS* which require special consideration or unique erosion and sediment control measures. Refer to the VESCH, Chapter 6 for criteria.

☒ ☐ ☐

*DEVELOPMENT PLAN* for the site showing all improvements such as buildings, structures, parking areas, access roadways, above and below ground utilities, stormwater management and drainage facilities, trails or sidewalks, proposed vegetation and landscaping, amenities, etc.

☒ ☐ ☐

*LOCATION OF PRACTICES* proposed for erosion and sediment control, tree protection and temporary stormwater management due to land disturbance activities at the site. Use standard abbreviations, labels and symbols consistent for plan views based on minimum standards and specifications in Chapter 3 of the VESCH.

☒ ☐ ☐

*TEMPORARY STOCKPILE AREAS* or staging and equipment storage areas as required for onsite or offsite construction activities or indicate that none are anticipated for this project.

☐ ☐ ☒

*OFFSITE LAND DISTURBING AREAS* including borrow sites, waste areas, utility extensions, etc. and required erosion and sediment controls. If none are anticipated for the project, then indicate on the plans by general or erosion and sediment control notes.

☒ ☐ ☐

*DETAILS* or alternately, appropriate reference to current minimum standards and specifications of the VESCH for each measure proposed for the project. Non-modified, standard duplicated details (silt fence, diversion dikes, etc.) may be referenced to the current version of the VESCH. Specific dimensional or modified standards (basins, traps, outlet protections, check dams, etc.) require presentation on detail sheets. Schedules or tables may be used for multiple site measures such as sediment traps, basins, channels, slope drains, etc. Any modification to standard details should be clearly defined, explained and illustrated.

Yes No N/A

☒ ☐ ☐

*MAINTENANCE PLAN* or alternately, appropriate reference to current minimum standards and specifications of the VESCH, outlining the inspection frequency and maintenance requirements for all erosion and sediment control measures proposed for the project.

☐ ☐ ☒

*TRENCH DEWATERING* methods and erosion and sediment controls, if anticipated for the project.

☒ ☐ ☐

*CONSTRUCTION SEQUENCE* outlining the anticipated sequence for installation of erosion and sediment controls and site, grading and utility work to be performed for the project by the site contractor.

☒ ☐ ☐

*PHASING PLAN* if required for larger project sites that are to be developed in stages or phases.

☒ ☐ ☐

*STANDARD COUNTY NOTES* are required to be placed on the erosion and sediment control plan. Refer to the standard James City County Erosion and Sediment Control Notes dated May 5, 1999.

☒ ☐ ☐

*PROFESSIONAL SEAL AND SIGNATURE* required on final and complete approved plans, drawings, technical reports and specifications.

### III. NARRATIVE:

Yes No N/A

☒ ☐ ☐

*PROJECT DESCRIPTION* briefly describing the nature and purpose of the land disturbing activity and the acreage to be disturbed.

☒ ☐ ☐

*EXISTING SITE CONDITIONS* description of existing topography, land use, cover and drainage patterns at the site.

☒ ☐ ☐

*ADJACENT AREA* descriptions of neighboring onsite or offsite areas such as streams, lakes, property, roads, etc. and potential impacts due to concentrated flow or runoff from the land disturbing activity.

☐ ☐ ☒

*OFFSITE DISTURBED AREA* descriptions of proposed borrow sites, water or surplus areas, utility extensions and erosion and sediment controls to be implemented.

☒ ☐ ☐

*SOILS DESCRIPTION* briefly summarizing site, disturbed area and drainage basin soils including name, unit, hydrologic soil group (HSG) classification, surface runoff potential, erodibility, permeability, depth, texture, structure, erosion hazards, shrink-swell potential, limitations for use and anticipated depths to bedrock and the seasonal water table, as applicable.

☐ ☐ ☒

*CRITICAL AREAS* on the site which may have potentially serious erosion and sediment control problems and special considerations required (i.e. steep slopes, hydric soils, channels, springs, sinkholes, water supply reservoirs, groundwater recharge areas, etc.)

Yes No N/A

☒ ☐ ☐

*PROPOSED EROSION & SEDIMENT CONTROL MEASURES* inclusive to the specific erosion and sediment control plan as proposed for the land disturbing activity. Measures should be consistent with those proposed on the site drawings. Address general use, installation, limitations, sequencing and maintenance requirements for each control measure.

☒ ☐ ☐

*STABILIZATION MEASURES* required for the site, either temporary or permanent, and during and following construction including temporary and permanent seeding and mulching, paving, stone, soil stabilization blankets and matting, sodding, landscaping or special stabilization techniques to be utilized at the site.

☒ ☐ ☐

*STORMWATER MANAGEMENT CONSIDERATIONS* for the site, either of temporary or permanent nature, and strategies, sequences and measures required for control. May reference the stormwater management plan for the site, if prepared, for permanent stormwater management facilities and control of drainage once the site is stabilized.

#### IV. CALCULATIONS:

Yes No N/A

☒ ☐ ☐

*CALCULATIONS AND COMPUTATIONS* associated with hydrology, hydraulics and design of proposed temporary and permanent erosion and sediment control measures including: sediment traps and basins, diversions, stormwater conveyance channels, culverts, slope drains, outlet protections, etc. Computations are not required on the construction plan and may be attached in a supplemental erosion and sediment control plan design report, if presented in a clear and organized format.

☒ ☐ ☐

*TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET* submitted for each basin along with schematic or sketch cross-section showing applicable design and construction data, storage volumes (wet-dry), dimensions and elevations. Peak design runoff to be based on the 2- or 25-year design storm event based on maximum disturbed site conditions (existing, interim or proposed conditions) in accordance with Minimum Standard 3.14 of the VESCH.

**JAMES CITY COUNTY, VIRGINIA  
ENVIRONMENTAL DIVISION**

**STORMWATER MANAGEMENT DESIGN PLAN CHECKLIST**

**I. GENERAL:**

Yes No N/A

☒ ☐ ☐

**FAMILIARITY** with current versions of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual; Chapter 8, Erosion and Sediment Control and Chapter 23, Chesapeake Bay Preservation ordinances of the Code of James City County, Virginia; the Virginia Erosion and Sediment Control Handbook (VESCH); and the Virginia Stormwater Management Handbook (VSMH).

☐ ☐ ☒

**WAIVER OR EXCEPTION** if necessary, requested in writing, for the plan approving authority to waive or except the requirements of Chapter 23, Chesapeake Bay Preservation ordinance in accordance with procedure established in Sections 23-14 through 23-17 of the ordinance. Applies to the review case only.

☐ ☐ ☒

**VARIANCE REQUEST** if necessary, requested in writing for the plan approving authority to waive or modify any of the minimum standards and specifications of the VESCH deemed inappropriate based on site conditions specific to this review case only. Variances which are approved shall be properly documented in the plan and become part of the approved erosion and sediment control plan for the site.

☒ ☐ ☐

**PROFESSIONAL SEAL AND SIGNATURE** required on final and complete approved stormwater management plans, drawings, technical reports and specifications.

☒ ☐ ☐

**WORKSHEET FOR BMP POINT SYSTEM** to ensure the stormwater management plan for the project attains at least 10 BMP points (New Development) or traditional pollutant load reduction computations per the Chesapeake Bay Local Assistance Manual (Redevelopment Only)

☐ ☐ ☒

**PROPOSED CONSERVATION EASEMENT AREAS** for any natural open space points claimed in the BMP worksheet.

☐ ☒ ☐

**INSPECTION/MAINTENANCE AGREEMENT** is required to be prepared and executed with the County for the project.

☐ ☐ ☒

**FEMA FIRM PANEL** reference with designated special flood hazard areas or zone designations associated with the site, as applicable.

☐ ☐ ☐

**DRAINAGE AREA MAP** at a maximum scale of 1"=200' scale showing drainage area boundaries for pre- and postdevelopment conditions and associated time of concentration flow paths. Labels to include drainage area size, runoff coefficient or curve number and time of concentration for each subarea shown on the map.



Yes No N/A

☒ ☐ ☐

*SOILS MAP* with soil symbols, boundaries and legend in accordance with the current Soil Survey of James City and York Counties and the City of Williamsburg, Virginia with approximate locations of the project site, BMPs and applicable drainage basins.

☒ ☐ ☐

*STORMWATER MANAGEMENT NARRATIVE* in a brief and simple format which describes the project; location; site and drainage basin soil characteristics; receiving water or drainage facility; existing site and drainage basin conditions (topography, land use, cover, slopes, etc.); proposed site development; proposed stormwater management and drainage plan including County BMP type selected; summary of hydrology and hydraulics; maintenance program; and any special assumptions utilized for development of the stormwater management and drainage design plan or computations.

☒ ☐ ☐

*TEMPORARY STORMWATER MANAGEMENT* (if applicable) for control of stormwater runoff encountered during construction activities in addition to measures provided in the erosion and sediment control plan or stormwater management/drainage plan for the site. Adequate protection measures or sequencing provided.

☒ ☐ ☐

*MODIFICATION PLAN* clearly defined for temporary sediment control structures which will be converted to permanent SWM/BMP structures. Includes appropriate hydrologic and hydraulic computations, conversions, sequencing and cleanout information or details. Normally related to primary control structures associated with dry detention or wet retention ponds. Normally not permitted for Group C or D categories such as bioretention, infiltration and filtering system facilities.

☒ ☐ ☐

*STORMWATER MANAGEMENT and DRAINAGE DESIGN REPORT* in a bound 8-1/2 x 11 inch size format. Report shall generally include a title sheet, date, project identification, owner and preparer information, table of contents, narrative, summaries and computations as required. Computations may include: backwater, closed conduit, headwater, hydraulic, hydraulic grade line, hydrology, inlet, open channel, storm sewer, water quality, extended detention or stream channel protection and multi-stage storm routing calculations, as applicable, for the project. Computation data may include hand or computer generated computations, maps or schematics. All information should be presented in a clear, easy to follow format and should closely match construction plan information.

☒ ☐ ☐

*PLAN VIEW* at 1 inch = 50 ft. scale or less (1" = 40', 1" = 30', etc.)

☒ ☐ ☐

North arrow and plan legend.

☒ ☐ ☐

Property lines.

☒ ☐ ☐

Adjacent property information.

☐ ☐ ☒

Existing site features and existing impervious cover areas.

☐ ☐ ☒

Impervious cover tabulations.

☐ ☐ ☒

Existing drainage facilities (natural or manmade)

☒ ☐ ☐

Existing environmentally sensitive areas (RPA, wetlands, floodplain, steep slopes, critical soils, buffers, etc.)

☒ ☐ ☐

Existing and proposed contours (1' or 2' contour interval) and spot elevations as necessary to define high and low topography.

☒ ☐ ☐

Existing and proposed easement locations.

Yes No N/A

☐ ☐ ☐  
☒ ☐ ☐

Proposed site improvements and proposed impervious cover areas.  
Proposed stormwater conveyance, drainage and management facilities  
with appropriate labeled construction data and information.

☐ ☐ ☐

Proposed landscaping and seeding plans (disturbed areas, pond interior,  
etc.)

☐ ☐ ☒

Proposed slope stabilization areas (riprap, blankets, matings, walls,  
etc.)

☒ ☐ ☐

Delineation of permanent pools and the 1-, 2-, 10- and 100-year Design  
Water Surface Elevations.

☐ ☐ ☒

Delineation of ponding, headwater, surcharge or backwater areas which  
may affect adjacent existing or proposed buildings, structures or  
upstream adjacent properties.

☐ ☐ ☒

Test boring locations with reference surface elevations (if known).

☒ ☐ ☐

Risers, barrels, underdrains, overflows and outlet protections.

☐ ☐ ☒

Emergency spillway level section and outlet channel.

☒ ☐ ☐

Existing and proposed site utilities and protection measures.

☒ ☐ ☐

Erosion and sediment control measures (for site or BMP).

☒ ☐ ☐

Maintenance or access corridors to permanent stormwater management,  
BMP or drainage facilities.

## II. STORMWATER CONVEYANCE SYSTEMS:

Yes No N/A

☒ ☐ ☐

### PLAN VIEWS

☒ ☐ ☐

Storm drain lengths, sizes, types, classes and slopes for all segments.  
Label directly on plan or use structure/pipe schedule.

☒ ☐ ☐

Access structure (inlets, manholes, junctions, etc.) rim elevations,  
inverts, type and required grate or top unit and lengths labeled.

☒ ☐ ☐

All structure numbers labeled.

☒ ☐ ☐

Adequate horizontal clearance from other site utilities or structures.

☐ ☒ ☐

**PROFILES** generally are not required but are encouraged to expedite review. If not  
provided, ensure all pipe segments have adequate minimum cover, do not exceed  
maximum depths of cover for the type/class of pipe specified and do not conflict with other  
site utilities or excavation areas.

☒ ☐ ☐

### DETAILS

☒ ☐ ☐

Typical storm drain bedding details or reference note.

☒ ☐ ☐

Standard details or reference note for all proposed access structure  
types (inlets, manholes, junctions, etc.).

☒ ☐ ☐

Inlet shaping detail or applicable reference note.

☒ ☐ ☐

Step detail or applicable reference note (if depth 4 ft. or more).

☐ ☐ ☒

Typical open channel details with designation, location, shape, type,  
bottom width, top width, lining, slope, length, side slope, and  
installation depth required for construction. Channel design data as  
necessary may also be included.

☒ ☐ ☐

Outlet protections at all pipe outfalls.

Yes No N/A

☒ ☐ ☐

**STORMWATER CONVEYANCE SYSTEM COMPUTATIONS**

- |                                     |                          |                                     |  |
|-------------------------------------|--------------------------|-------------------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Storm Sewer Design computations based on 10-year design event.   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Hydraulic Grade Line computations based on 10-year design event.   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Inlet computations based on current VDOT procedure for spread, ponding depth and grate size required.                              |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Culvert Headwater computations. Design based on 10-year design storm event and check only for 100-year storm event.                |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Open Channel computations based on 2-year design event for velocity and 10-year design event for capacity.                         |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Standard outlet protection or special energy dissipators.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Pipe thickness design computations, as required, for selected pipe type (live load, minimum cover, maximum height of cover, etc.). |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Adequate channel computations for receiving channels (based on field measured channel section data).                               |

**III. STORMWATER MANAGEMENT/BMP FACILITIES:**

Yes No N/A

☒ ☐ ☐

**HYDROLOGY** – An SCS based methodology is required for the design of stormwater management/BMP facilities with watersheds exceeding 20 acres. Under 20 acres, other generally accepted methodologies such as the modified rational, critical storm are allowable. Refer to Chapter 5 of the VESCH or Chapter 5 of the VSMH.

- |                                     |                          |                          |   |
|-------------------------------------|--------------------------|--------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Runoff Curve Number or Coefficient determinations: predeveloped and ultimate development land use scenarios.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Time of concentration: predeveloped and ultimate development indicating overland, shallow concentrated, and channel flow components (200 ft. maximum length for overland flow). |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Hydrograph generation (tabular or graphical): pre- and postdevelopment conditions for the 1-, 2-, 10- and 100-year design storm events.   |

☒ ☐ ☐

**FACILITY CONFIGURATION and MINIMUM SEPARATIONS**

- |                                     |                          |                                     |  |
|-------------------------------------|--------------------------|-------------------------------------|--|
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            | Screening and layout consistent with Section 24-98(d) of the Chapter 24 Zoning ordinance (landscaping, screening, visibility, etc.).   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Basic considerations for safety and unauthorized entry.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Proper length to width ratio (Typically 2H:1V).  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Facilities with deep pools (4 feet or more in depth) provided with two benches. Fifteen (15) ft. safety bench outward from normal pool at maximum 6 percent slope and aquatic bench inward from normal shoreline below normal pool. Narrower widths may be considered on a case-by-case basis. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Pond buffer minimum 25 feet outward from maximum design WSEL. Additional setbacks may be required to permanent structures.   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | No trees, shrubs or woody plants within 15 feet of embankment toe or 25 feet from principal spillway structure.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Infiltration and filtering system facilities generally located at least 100 feet horizontally from any water supply well; 100 feet from any downslope building; and 25 feet from any upslope buildings, unless site specific investigation allows for reduced separation.                      |

Yes No N/A

☒ ☐ ☐

#### HYDRAULIC COMPUTATIONS

- |                                     |                          |                                     |   |
|-------------------------------------|--------------------------|-------------------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Elevation- or Stage-Storage curve and/or tabular data.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Weir / Orifice Control – Extended Detention.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Weir / Orifice Control – riser 1-year control for channel protection.   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Weir / Orifice Control – riser 2-year control for quantity (if required).   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Weir / Orifice Control – riser 10-year control for quantity (if required).  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            | Inlet / Outlet (barrel) control – (All Storms).   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            | Check for barrel control prior to riser orifice flow to prevent slug flow-water hammer conditions.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Emergency spillway capacity and depth of flow.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Elevation – Discharge (Outlet Rating) curve and/or table. Provide all supporting calculations and/or design assumptions.                        |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Adequate channel computations for receiving channel. May be waived if facility is designed based on current Stream Channel Protection criteria. |

☒ ☐ ☐

#### POND or RESERVOIR ROUTING

- |                                     |                          |                                     |  |
|-------------------------------------|--------------------------|-------------------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Storage-Indication Routing of postdeveloped inflow hydrographs for the 1-, 2-, 10-, and 100-year design storms. Preference is for structure to discharge up to the 10-year storm through the principal spillway and pass the 100-year storm with a minimum 1 foot of freeboard through a combination principal and emergency spillways. If no emergency spillway is provided, riser must be large enough to pass the design high water flow and trash without overtopping the facility, have 3 square feet or more of cross-sectional area, contain a hood type inlet and have a minimum freeboard of 2 feet. Token spillways with minimum 8 ft. width are also recommended at or above the design 100-year storm elevation. |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Downstream hydrographs at established study points, if conditions warrant (i.e. facility discharge combined with uncontrolled bypass).   |

☒ ☐ ☐

#### MISCELLANEOUS COMPUTATIONS

- |                                     |                          |                                     |   |
|-------------------------------------|--------------------------|-------------------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Water quality volume for permanent pool based on selected BMP treatment volume (WQv).                               |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Water quality volume for extended detention base on selected BMP treatment volume (WQv) with drawdown computations. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Drawdown computations for the 1-year, 24 hour detention for stream channel protection criteria.                     |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Pond drain computations (within 24 hours).  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Anti-seep collar design (concrete preferred) or match material type.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Filter diaphragm design (or alternative method of controlling seepage).   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Riser / base structure flotation analyses. FS = 1.25 minimum.   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Downstream danger reach study and/or emergency action plan (if conditions warrant).                                 |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Upstream backwater analyses onto offsite adjacent property (if conditions warrant).                                 |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 100 year floodplain impacts (if conditions warrant).  |

Yes No N/A

☒ ☐ ☐

#### GEOTECHNICAL REQUIREMENTS

☐ ☒ ☐

Geotechnical Report with recommendations specific to BMP facility type selected. Report prepared by a registered professional engineer. Requires submission, review and approval prior to issuance of Land Disturbance Permit.

☐ ☐ ☒

Initial Feasibility Testing requirements satisfied as per Appendix E of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual. (Infiltration, Bioretention and Filtering System BMP types only).

☐ ☐ ☒

Concept Design Testing requirements satisfied as per Appendix E of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual. (Infiltration, Bioretention and Filtering System BMP types only).

☐ ☒ ☐

Minimum Boring locations: borrow area, pool area, principal control structure, top of facility near one abutment and emergency spillway if provided.

☐ ☒ ☐

Boring logs with Unified Soil Classification (ASTM D2487), soils descriptions and depths to bedrock and the seasonal water table indicated.

☒ ☐ ☐

Standard County Record Drawing/Construction Certification note provided on plan. *Note: It is understood that preparation of record drawings and construction certifications as required for project facilities may not necessarily be performed by the plan preparer. These components may be performed by others.*

☒ ☐ ☐

#### PRINCIPAL SPILLWAY PROFILE AND ASSOCIATED DETAILS

☒ ☐ ☐

##### EXISTING GROUND AND PROPOSED GRADE

☒ ☐ ☐

Embankment or excavation side slopes labeled (3H:1V maximum).

☒ ☐ ☐

Minimum top width labeled (per VESCH or VSMH requirements).

☐ ☐ ☒

Removal of unsuitable material under proposed facility (per Geotechnical Report requirements).

Yes No N/A

☐ ☐ ☒

**CORE TRENCH**

☐ ☐ ☐  
☐ ☐ ☐

Material (per plan or Geotechnical Report).

Bottom width (4' minimum or greater as dictated by Geotechnical Report recommendations).

☐ ☐ ☐  
☐ ☐ ☐

Side slopes (1:1 maximum steepness)

Depth (4' minimum or greater as dictated by Geotechnical Report).

☒ ☐ ☐

**PRINCIPAL CONTROL STRUCTURE. RISER OR SIMILAR STRUCTURE (DETAILS REQUIRED FOR ALL ITEMS)**

☒ ☐ ☐  
☒ ☐ ☐  
☒ ☐ ☐  
☒ ☐ ☐  
☒ ☐ ☐  
☒ ☐ ☐  
☒ ☐ ☐

Durable, watertight, resistant material (concrete preferred).

Riser diameter is at least 1.25 times larger than barrel diameter.

All pertinent dimensions and elevations shown.

Control orifice or weir dimensions and elevations shown.

Trash rack – removable – for each release.

Anti-vortex device, baffle or plate.

Riser base structure with dimensions and embedment specifications (concrete preferred).

☒ ☐ ☐

Interior access (steps, ladders, etc.) for maintenance for structures over 4 feet in height. Excessively high risers may need some form of exterior access on top portion.

☒ ☐ ☐

Low flow orifice with trash rack device.

☒ ☐ ☐

**PRINCIPAL CONTROL STRUCTURE OUTLET BARREL**

☒ ☐ ☐

Material (ASTM C-361 reinforced concrete pipe) with watertight joints.

Prior approval required for all other pipe material (other RCP types, CMP, CPP, PVC, etc.).

☐ ☐ ☐

Support and bedding requirements for barrel – concrete cradles, etc. or as recommended by the Geotechnical Report.

☒ ☐ ☐

Pipe inverts, length, size, class and slope shown.

☒ ☐ ☐

Flared end section or endwall provided on barrel outlet.

☒ ☐ ☐

**SEEPAGE CONTROL**

☒ ☐ ☐

Phreatic line shown (4:1 slope measured from the intersection of the embankment and the principal spillway design high water).

☒ ☐ ☐

**ANTI-SEEP COLLARS**

☒ ☐ ☐

Anti-seep collar, concrete preferred.

☒ ☐ ☐

Size – 15 percent increase in length of saturation using outside pipe diameter.

☒ ☐ ☐

Spacing and location on barrel (located at least 2 feet from a pipe joint).

☐ ☐ ☒

**FILTER DIAPHRAGMS**

☐ ☐ ☐

Design based on latest NRCS design methods and certified by a professional engineer.



Yes No N/A

☒ ☐ ☐

**ELEVATION AND DIMENSIONAL DESIGN DATA**

- ☐ ☐ ☒ Top of facility – construction height and settled height (10 percent settlement).
- ☐ ☐ ☒ Crest of principal control structure spillway at least one (1) foot below crest of emergency spillway, if provided.
- ☐ ☐ ☒ Minimum freeboard of one (1) foot above the 100-year design high water elevation for facilities with an emergency spillway.
- ☒ ☐ ☐ Minimum freeboard of two (2) feet above the 100-year design high water elevation for facilities without an emergency spillway or in accordance with the SCS National Engineering Handbook (prior approval required).
- ☒ ☐ ☐ Basin Sediment Clean-Out elevation (permanent mode). Typically 10 to 25 percent of water quality volume.

☒ ☐ ☐

**CROSS SECTION THROUGH FACILITY**

- ☒ ☐ ☐ Existing Ground.
- ☒ ☐ ☐ Proposed grade.
- ☒ ☐ ☐ Top of facility – constructed and settled.
- ☐ ☐ ☒ Location of emergency spillway with side slopes labeled (emergency spillway in cut).
- ☐ ☐ ☒ Bottom of core trench (4' minimum).
- ☐ ☐ ☐ Location of each soil boring.
- ☒ ☐ ☐ Barrel location.
- ☐ ☐ ☒ Existing and proposed utility location/protection.

☐ ☐ ☒

**EMERGENCY SPILLWAY PROFILE**

- ☐ ☐ ☐ Existing ground.
- ☐ ☐ ☐ Inlet, level (control) and outlet sections per SCS.
- ☐ ☐ ☐ Spillway and crest elevations.

☒ ☐ ☐

**PRETREATMENT DEVICES** of adequate depth and properly designed using required pretreatment volumes for the selected County BMP facility type. Including, but not limited to: sediment forebays, sediment basins, sumps, grass channels, gravel diaphragms, plunge pools, chamber separators, manufactured systems or other acceptable methods.

Yes No N/A

☒ ☐ ☐

**CONSTRUCTION SPECIFICATIONS and NOTES**

- |                                     |                          |                                     |   |
|-------------------------------------|--------------------------|-------------------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Anticipated sequence of construction for BMP (consistent with erosion and sediment control plan). |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Provisions to control base stream or storm flow conditions encountered during construction.       |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Site and subgrade preparation requirements.   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Embankment, fill and backfill material soil and placement (lift) thickness requirements.          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Compaction and soil moisture content requirements.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Geosynthetics for drainage, filtration, moisture barrier, separation, and reinforcement purposes. |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Clay or synthetic (PVC or HDPE) pond liners.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Storm drain, underdrain and pipe conduit requirements.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Minimum depth of pipe cover for temporary (construction) and final cover conditions.              |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Permanent shutoff valve and pond drain.   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Concrete requirements for structural components.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Riprap and slope protection.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Access or maintenance road surface, base, subbase.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Temporary and permanent stabilization measures.   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Temporary or permanent safety fencing.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            | BMP Landscaping (deep, shallow, fringe, perimeter, etc.)  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Dust and traffic control (if warranted).  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            | Construction monitoring and certification by professional.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            | Other: _____  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            | Other: _____  |

☒ ☐ ☐

**MAINTENANCE PROVISIONS**

- |                                     |                          |                                     |   |
|-------------------------------------|--------------------------|-------------------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Entity responsible for maintenance identified.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Maintenance Plan which outlines the long-term schedule for inspection/maintenance of the facility and forebays.   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Maintenance access from public right-of-way or publicly traveled road.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Maintenance easement provided encompassing high water pool and buffer, principal and emergency spillways, outlet structures, forebays, embankment area and possible sediment-removal stockpile areas. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Minimum 6 foot wide public safety shelf (landing) or alternative fencing.   |

**IV. OUTLET PROTECTIONS:**

Yes	No	N/A
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Sized for maximum design release (generally 10-year storm).

Flared end section or endwall.

Dimensions.

Rock or riprap size, quantity and placement thickness.

Slope at 0 percent (Level Grade).

Geotextiles (nonwoven).

Special energy dissipators are required for design discharge velocities that exceed eighteen (18) feet per second; or if use of standard outlet protection would result in velocities exceeding permissible channel velocities; or if space restricts or limits their use.

**IV. ADDITIONAL COMMENTS OR INFORMATION SPECIFIC TO THE PLAN:**

Plan Preparer: \_\_\_\_\_

Date: \_\_\_\_\_

Copy of JCC: SWMProg/BMP/Checklist/ChkList

**AES CONSULTING ENGINEERS**  
Engineering, Surveying, and Planning  
5248 Olde Towne Road, Suite 1  
WILLIAMSBURG, VIRGINIA 23188

**Phone: (757) 253-0040**

**Fax: (757) 220-8994**

# LETTER OF TRANSMITTAL

ATTN: **Jason Beck**

CO.: Environmental Inspector  
JCC

Address: P.O. Box 8784  
101-E Mounts Bay Road  
Williamsburg, Virginia 23187-  
8784

Mail for signatures

cc:

DATE 11/06/2007	JOB NO. 9069-02
FROM: Matt Good	
RE BMP RECORD DRAWINGS (MYLAR COPY)	

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**CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION  
FOR SWMP POND #1  
WINDSORMEADE MARKETPLACE  
AES Project No.:9069-02  
December 20, 2003**

**I. PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN**

A.	Pre-Development Drainage Area to Point of Concern =	13.90 Acres
B.	Pre-development Land Use, Soil Classification and Calculation of Composite Curve Number Wooded, B and C soils	60
C.	Pre-Development Time of Concentration Calculations	
1)	Overland Flow (maximum 300 feet) Surface description (table 5-7) Manning's roughness coefficient, n (table 5-7) Length of overland flow, L 2-year 24-hour rainfall, P2 Average slope of overland flow, s Travel time, $T_t = (0.007 * (n * L)^{0.8}) / (P2^{0.5} * s^{0.4})$	Woods, Good Cond. 0.4 250 Feet 3.5 inches 0.04 feet per foot 0.54 hours
2)	Shallow concentrated flow (maximum 300 feet) Surface description, paved or unpaved Length of shallow concentrated flow, L Average slope of shallow concentrated flow, s Average velocity, v Travel time, $T_t = L / (3600 * v)$	Wooded, Good Cond. 300 Feet 0.03 feet per foot 2.8 feet per second 0.03 hours
3)	Channel or Pipe Flow Length of channel flow, L Average velocity of channel flow, v Travel time, $T_t = L / (3600 * v)$	0 Feet 2.5 feet per second 0.00 hours

**Total Time of Concentration =**

**0.57 hours  
34 minutes**

**II. POST-DEVELOPMENT CONDITIONS TO POINT OF CONCERN (for total site and [REDACTED])**

A.	Post-Development Drainage Area to Point of Concern =	
B.	Post-development Land Use, Soil Classification and Calculation of Composite Curve Number	
C.	Post-Development Time of Concentration Calculations	
1)	Overland Flow (maximum 300 feet) Surface description (table 5-7) Manning's roughness coefficient, n (table 5-7) Length of overland flow, L 2-year 24-hour rainfall, P2 Average slope of overland flow, s Travel time, $T_t = (0.007 * (n * L)^{0.8}) / (P2^{0.5} * s^{0.4})$	70 Woods, good condition 0.4 100 Feet 3.5 inches 0.03 feet per foot 0.29 hours
2)	Shallow concentrated flow (maximum 300 feet) Surface description, paved or unpaved Length of shallow concentrated flow, L Average slope of shallow concentrated flow, s Average velocity, v Travel time, $T_t = L / (3600 * v)$	paved 115 Feet 0.01 feet per foot 2.00 feet per second 0.02 hours
3)	Channel or Pipe Flow Length of channel flow, L Average velocity of channel flow, v Travel time, $T_t = L / (3600 * v)$	812 Feet 5.6 feet per second 0.04 hours

**Total Time of Concentration =**

**0.29 hours  
21 minutes**

20.90 Acres  
RCN 70 ??  
89.6% imperv.

NEED COMPS  
SEEMS LOW  
FOR A  
89.6%  
IMPERV  
WATERSHED  
10.1 min ?  
PER  
STORM ARE  
DISLOW

### III. PROPOSED ESTIMATED POND(S) VOLUME

Elevation	Depth	Area (sq. ft.)	Incremental Volume (cu. ft.)	Inc. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
73	0	6701	0	0	0	0
74	1	12,612	9,657	358	9,657	358
75	1	13,689	13,151	487	22,807	845
76	1	14,799	14,244	528	37,051	1,372
77	1	15,942	15,371	569	52,422	1,942
78	1	22,057	19,000	704	71,421	2,645
79	1	28,821	25,439	942	96,860	3,587
80	1	30,977	29,899	1,107	126,759	4,695
81	1	33,191	32,084	1,188	158,843	5,883
82	1	35,463	34,327	1,271	193,170	7,154
83	1	37,794	36,629	1,357	229,799	8,511
84	1	40,219	39,007	1,445	268,805	9,956

$$\begin{aligned} & \frac{77.7-77}{78-77} = \frac{x-52422}{71421-52422} \\ & \frac{0.7}{1} = \frac{x-52422}{18999} \end{aligned}$$

$$\begin{aligned} & 0.7 \\ & x = 65721 \text{ CF} \end{aligned}$$

### IV. DETERMINING REQUIRED WATER QUALITY VOLUME

Due to preliminary considerations, it is desired to provide this site extended detention wet pond to achieve a 10 point BMP rating for the facility. Under the James City County guide lines for storm water management BMPs, the extended detention wet pond may have one half of the water quality volume stored in the permanent pool and one half of the water quality volume released in a 24-hour period.

Percent Impervious of the BMP Watershed, Post-Development

Drainage Area of the BMP Watershed

Impervious Acres of BMP Watershed

Calculation for Water Quality Volume, WQ<sub>v</sub>

$$WQ_v = (2.0 \text{ inches per impervious acre}) * (\text{impervious acres of BMP watershed})$$

$$WQ_v = (2.0 \text{ inches}) * (1 \text{ ft} / 12 \text{ inches}) * (43560 \text{ sq. Ft per acre}) * (\text{impervious acres of BMP watershed})$$

$$WQ_v = (2.0 \text{ inches}) * (1 \text{ ft} / 12 \text{ inches}) * (43560 \text{ sq. Ft per acre}) *$$

$$WQ_v =$$

$$WQ_v (\text{provided}) =$$

$$\begin{aligned} & 89.6\% \quad \frac{20.9}{20.19} \text{ acres} \\ & 18.18\% \text{ acres} \end{aligned}$$

18.10	=	131406 cu. Ft
65703 cu. Ft		Required Volume for Permanent Pool
65703 cu. Ft		Design Volume for Dry Storage (1" per Impervious Acre)
65718 cu. Ft		Water Quality Volume Provided for Wet pool
67137 cu. Ft		Water Quality Volume Provided for Dry pool
132855		Total Water quality volume

$$77.7 \sim 0.7$$

Elevation of total WQ<sub>v</sub> =

Elevation of release inlet for 1/2 water quality volume =

Average head, in feet, on release inlet =

Average release rate calculation

$$\frac{67,137.0 \text{ cubic feet}}{(24 \text{ hours} \times 60 \text{ minutes/hour} \times 60 \text{ seconds/minute})} =$$

$$0.8 \text{ cfs}$$

$$0.77$$

Calculation of size of release inlet for 1/2 Water Quality Volume

$$\text{Diameter of Release Inlet} = 2 * (Q / ((64.32 * (h / 2)) ^ (1/2) * 0.6 * 3.14))) ^ (1/2)$$

where, Q equals Average Release Rate, in cfs

h equals Average Head, in feet

$$\text{Diameter of Release Inlet} = 0.50 \text{ feet, or}$$

Note: A design with an orifice size of 3" will be used for channel protection requirements

$$\begin{aligned} & \text{6 inches MIN} \\ & 0.77 \text{ cfs} \end{aligned}$$

$$\begin{aligned} & \frac{0.77 \text{ cfs}}{0.6 \sqrt{64.4 (1.2)}} = \\ & 0.146 \text{ SF} \end{aligned}$$

$$\begin{aligned} & \pi d^2 = 0.146 \\ & d^2 = 0.1859 \\ & 0.435 \text{ ft} \end{aligned}$$



## Channel Protection

### Channel Protection Volume

#### Post Development Watershed Data

Area = 20.90 Acres 0.0327sq.mi.  
Runoff Curve No. = 70  
Time of Concentration = 0.260 hr.  
Return Period = 1 Yr.

Too LOW

Runoff Depth = 2.8 in.

#### Initial Abstraction (From TR55 Equation 2-2)

$$I_a = (200/CN)^{-2}$$
$$I_a = 0.857$$

#### Unit Peak Discharge (From TR55 Equation for Exhibit 4)

$$\log(Q_u) = C_0 + C_1 \log(T_c) + C_2 (\log(T_c))^2$$
$$Q_u = 719.46 \text{ csm/in}$$

#### Ratio of Peak Outflow Discharge to Peak Inflow Discharge

(From Maryland Stormwater Design Manual Figure D.11.2)

$$Q_o/Q_i = 0.024$$

#### Ratio of Volume of Storage to Volume of Runoff (From TR55 Figure 6.1)

$$V_s/V_r = C_0 + C_1(Q_o/Q_i) + C_2(Q_o/Q_i)^2 + C_3(Q_o/Q_i)^3$$
$$V_s/V_r = 0.648$$

$$V_s = 0.684 \text{ Ac-Ft}$$

$$V_s = 29792 \text{ cu.ft.}$$

Table F-2				
Coefficients for the equations used to generate figure 6-1				
Rainfall Dist.	C0	C1	C2	C3
I, IA	0.66	-1.76	1.96	-0.73
II, III	0.682	-1.43	1.64	-0.804

#### Average Release Rate

$$Q_i = 14.24 \text{ cfs}$$

$$Q_o/Q_i = 0.02$$

$$Q_o = 0.35 \text{ cfs}$$

AES Project No. 9069  
Job Title BMP No. 1

Area=	20.90 Acres	0.0327sq.mi.
CN=	70	
Tc=	0.260 hr.	
P=	2.8 in.	Rainfall depth for 1yr return period
Ia=	0.857	Initial abstraction is all losses before runoff begins. Ie surface depressions, water intercepted by vegetation, evaporation.....(See TR55 Chapter 2, Equation 2-1)
Qu=	719.46 csm/in	Unit Peak Discharge - Peak discharge per square mile per inch of runoff (Units are "cubic square miles per ing
Direct Runoff=	0.6 in.	Runoff in inches (See TR55 Chapter 2, Equation 2-1)
Qi=	14.24 cfs	Peak Inflow Discharge
Qo/Qi=	0.024	Ratio of Peak Inflow Discharge to Peak Outflow Discharge (See TR55 Chapter 6)
Qo=	0.35 cfs	Peak Outflow Discharge (See TR55 Chapter 6) Taken from Maryland Dept. of Stormwater Management Appendix D.11, figured. 11.2. The curve for 24hr detention used in Chart 1 was scaled and a curve was fit to the data points. The resulting equation, which appears on the chart yeilds a very good fit.
Vs/Vr=	0.648	Ratio of Volume Stored to Volume Realeased (See TR55 Chapter 6). Value Computed
Vs=	0.684 Ac-Ft	using equation for Figure 6-1 as shown in Appendix F.
Vs=	29,792 cu.ft.	Required Storage Volume

Average Flow Rate (Qo) 0.35 cfs  
Average head= 1.25 ft.

Area of orifice= 0.06 sq.ft.

Orifice diameter = 0.29 ft.  
Orifice diameter = 3.4 in.

This offers a place to start. After routing the 1yr storm through the oriface check the out put to make sure that the Required Storage Volume is actually detainid for 24 hours. If not adjust the orifice size and recompute.

# Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-----	1.35	3.92	-----	-----	18.17	22.72	-----	35.81	PRE-DEVELOPMENT
2	SCS Runoff	-----	11.28	20.72	-----	-----	58.48	69.46	-----	99.85	9069POST-DEVELOPMENT
5	Reservoir	2	0.27	0.35	-----	-----	25.80	38.22	-----	43.82	wet pond
<div> <div>Proj. file: bmp#1.GPW</div> <div>Run date: 12-22-2003</div> </div>											

# Reservoir Report

## Reservoir No. 2 - WET POND


Hydraflow Hydrographs by Intelisolve

### Pond Data

Pond storage is based on known contour areas. Average end area method used.

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	73.00	6,701	0	0
1.00	74.00	12,612	9,657	9,657
2.00	75.00	13,689	13,151	22,807
3.00	76.00	14,799	14,244	37,051
4.00	77.00	15,942	15,371	52,422
5.00	78.00	22,057	19,000	71,421
6.00	79.00	28,821	25,439	96,860
7.00	80.00	30,977	29,899	126,759
8.00	81.00	33,191	32,084	158,843
9.00	82.00	35,463	34,327	193,170
10.00	83.00	37,794	36,629	229,799
11.00	84.00	40,219	39,007	268,805

36" Riser  


### Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 24.0 ✓	3.0 ✓	0.0	0.0
Span in	= 24.0 ✓	3.0	0.0	0.0
No. Barrels	= 1 ✓	1	0	0
Invert El. ft	= 72.72 ✓	77.70 ✓	0.00	0.00
Length ft	= 61.0	0.0	0.0	0.0
Slope %	= 1.18	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 18.00 ✓	0.00	0.00	0.00
Crest El. ft	= 80.19 ✓	0.00	0.00	0.00
Weir Coeff.	= 3.33 ✓	3.33	0.00	0.00
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

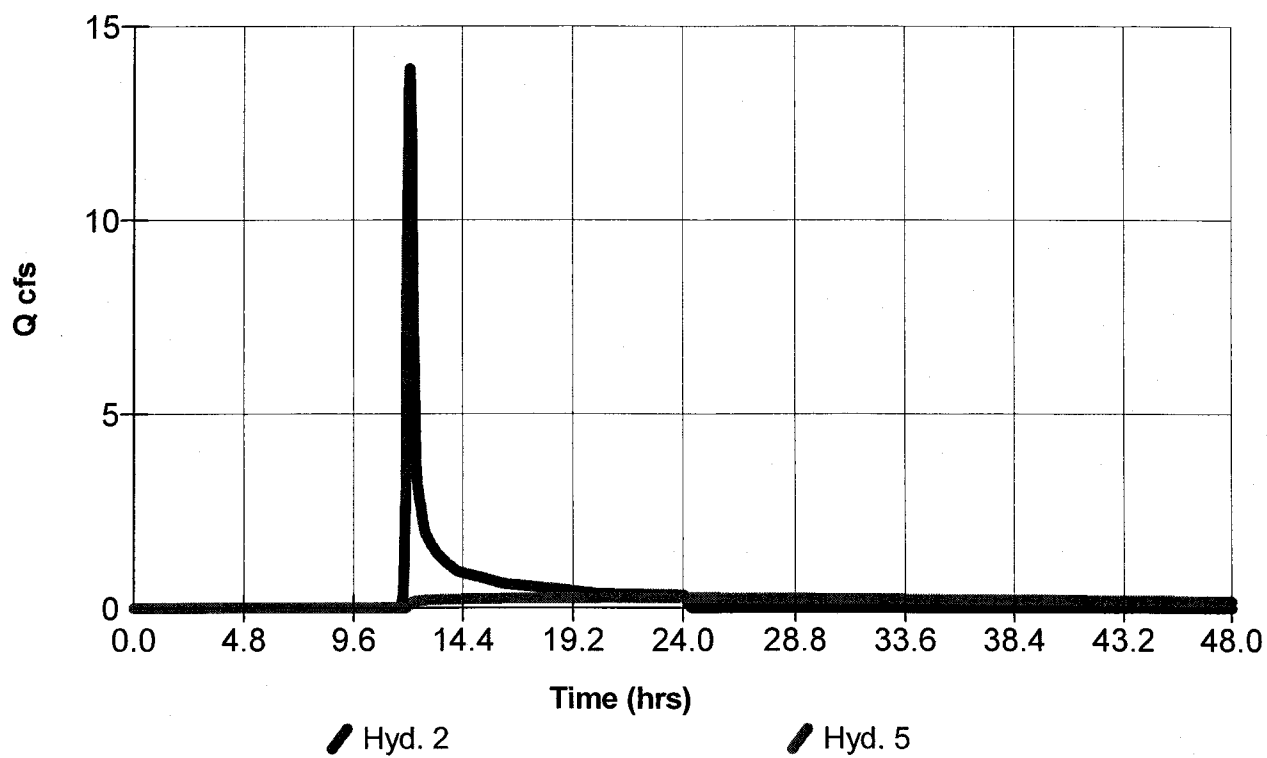
### Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	Civ D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	73.00	0.00	0.00	---	---	0.00	---	---	---	---	0.00
1.00	9,657	74.00	0.51	0.00	---	---	0.00	---	---	---	---	0.00
2.00	22,807	75.00	0.51	0.00	---	---	0.00	---	---	---	---	0.00
3.00	37,051	76.00	0.51	0.00	---	---	0.00	---	---	---	---	0.00
4.00	52,422	77.00	0.51	0.00	---	---	0.00	---	---	---	---	0.00
5.00	71,421	78.00	0.51	0.10	---	---	0.00	---	---	---	---	0.10
6.00	96,860	79.00	0.51	0.26	---	---	0.00	---	---	---	---	0.26
7.00	126,759	80.00	0.51	0.35	---	---	0.00	---	---	---	---	0.35
8.00	158,843	81.00	39.38	0.42	---	---	39.38	---	---	---	---	39.80
9.00	193,170	82.00	43.38	0.48	---	---	43.36	---	---	---	---	43.84
10.00	229,799	83.00	46.03	0.54	---	---	46.01	---	---	---	---	46.55
11.00	268,805	84.00	48.48	0.59	---	---	48.39	---	---	---	---	48.98

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	1.35	2	744	13,193	---	---	---	PRE-DEVELOPMENT
2	SCS Runoff	11.28	2	728	46,799	---	---	---	9069POST-DEVELOPMENT
5	Reservoir	0.27	2	1450	30,547	2	79.15	101,418	wet pond
Proj. file: bmp#1.GPW			Return Period: 1 yr				Run date: 12-22-2003		

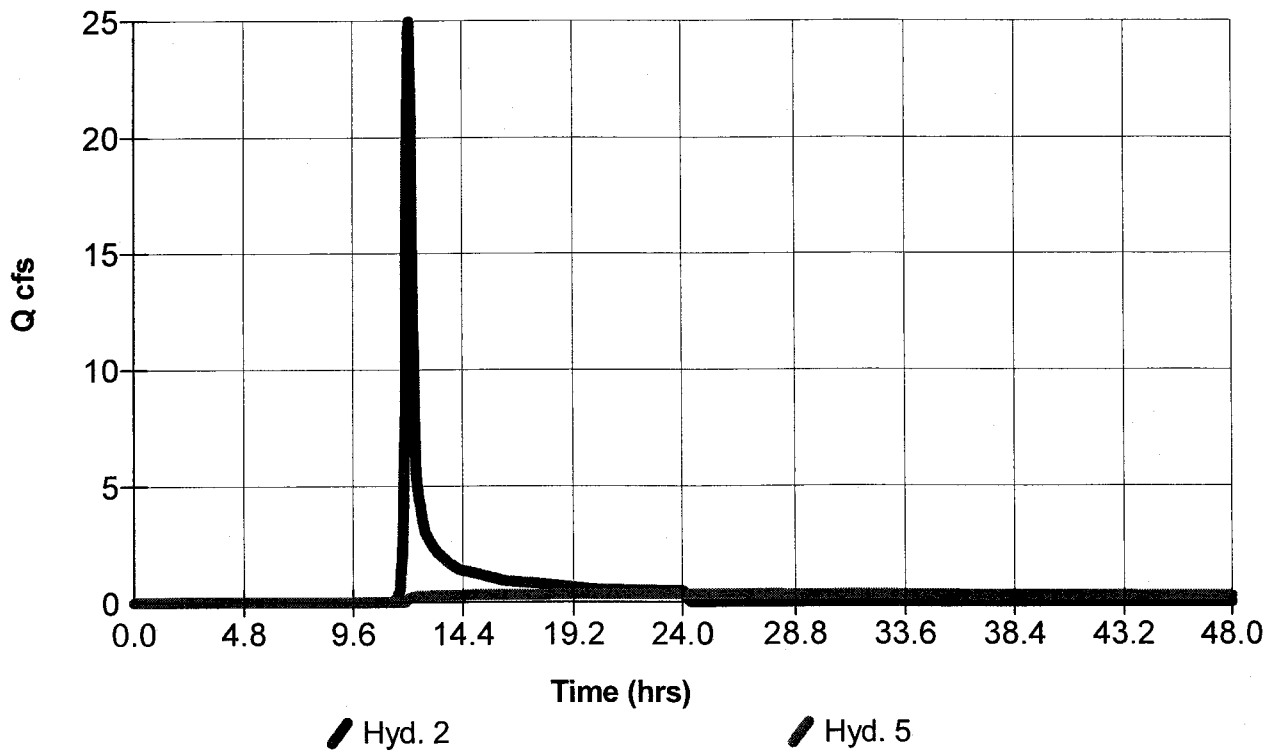
Hyd. No. 5 - Reservoir - 1 Yr -  $Q_p = 0.27$  cfs - wet pond



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	3.92	2	738	26,510	---	---	---	PRE-DEVELOPMENT
2	SCS Runoff	20.72	2	728	77,847	---	---	---	9069POST-DEVELOPMENT
5	Reservoir	0.35	2	1452	41,418	2	80.07	128,965	wet pond
Proj. file: bmp#1.GPW				Return Period: 2 yr				Run date: 12-22-2003	

Hyd. No. 5 - Reservoir - 2 Yr -  $Q_p = 0.35$  cfs - wet pond

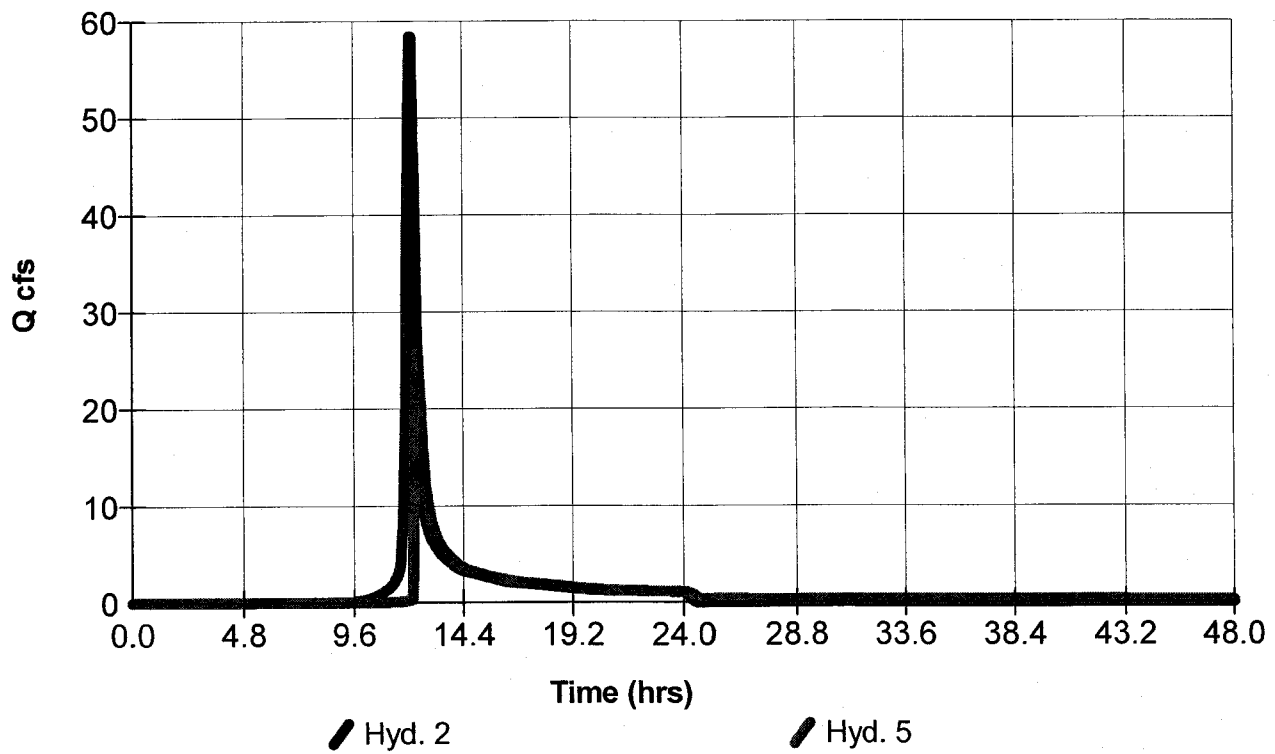




# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	18.17	2	736	89,392	---	----	-----	PRE-DEVELOPMENT
2	SCS Runoff	58.48	2	726	204,438	---	----	-----	9069POST-DEVELOPMENT
5	Reservoir	25.80	2	744	164,551	2	80.75	150,920	wet pond
Proj. file: bmp#1.GPW					Return Period: 10 yr			Run date: 12-22-2003	

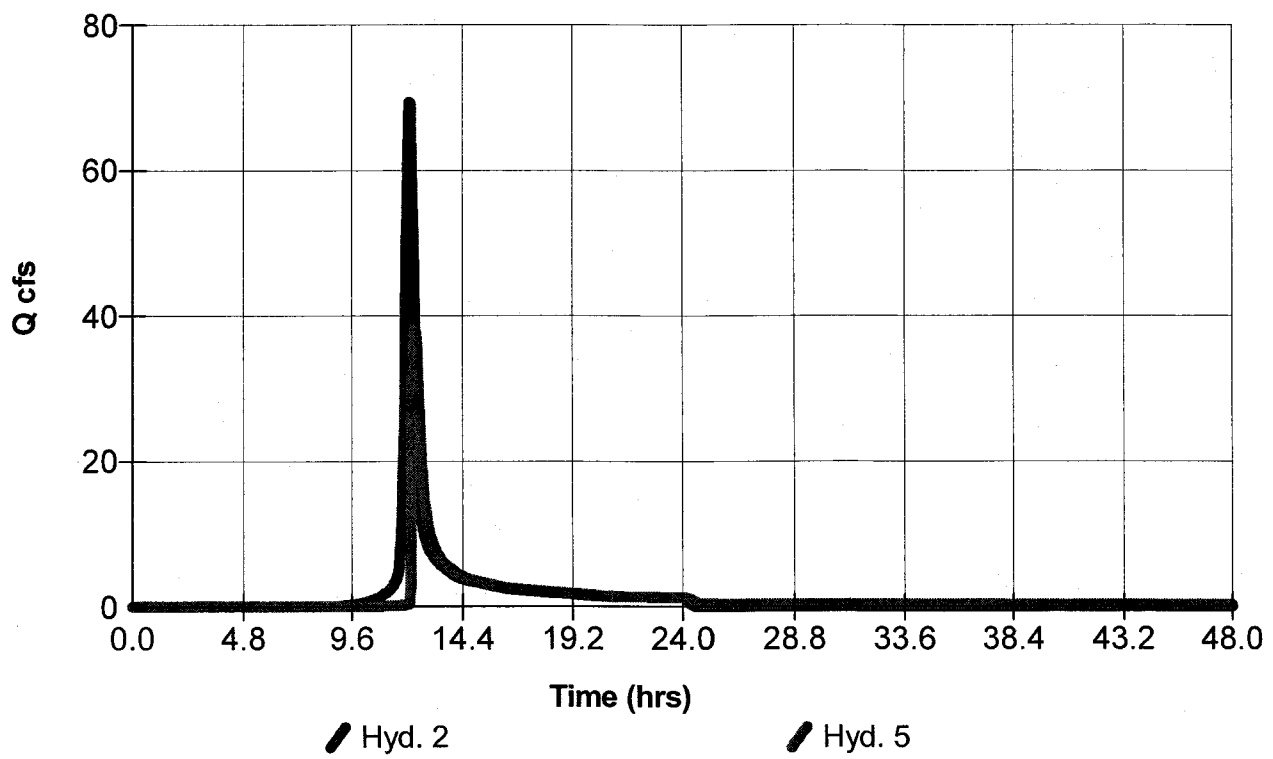
Hyd. No. 5 - Reservoir - 10 Yr -  $Q_p = 25.80$  cfs - wet pond



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	22.72	2	736	109,139	---	-----	-----	PRE-DEVELOPMENT
2	SCS Runoff	69.46	2	726	241,388	---	-----	-----	9069POST-DEVELOPMENT
5	Reservoir	38.22	2	740	201,446	2	80.96	157,404	wet pond
Proj. file: bmp#1.GPW				Return Period: 25 yr				Run date: 12-22-2003	

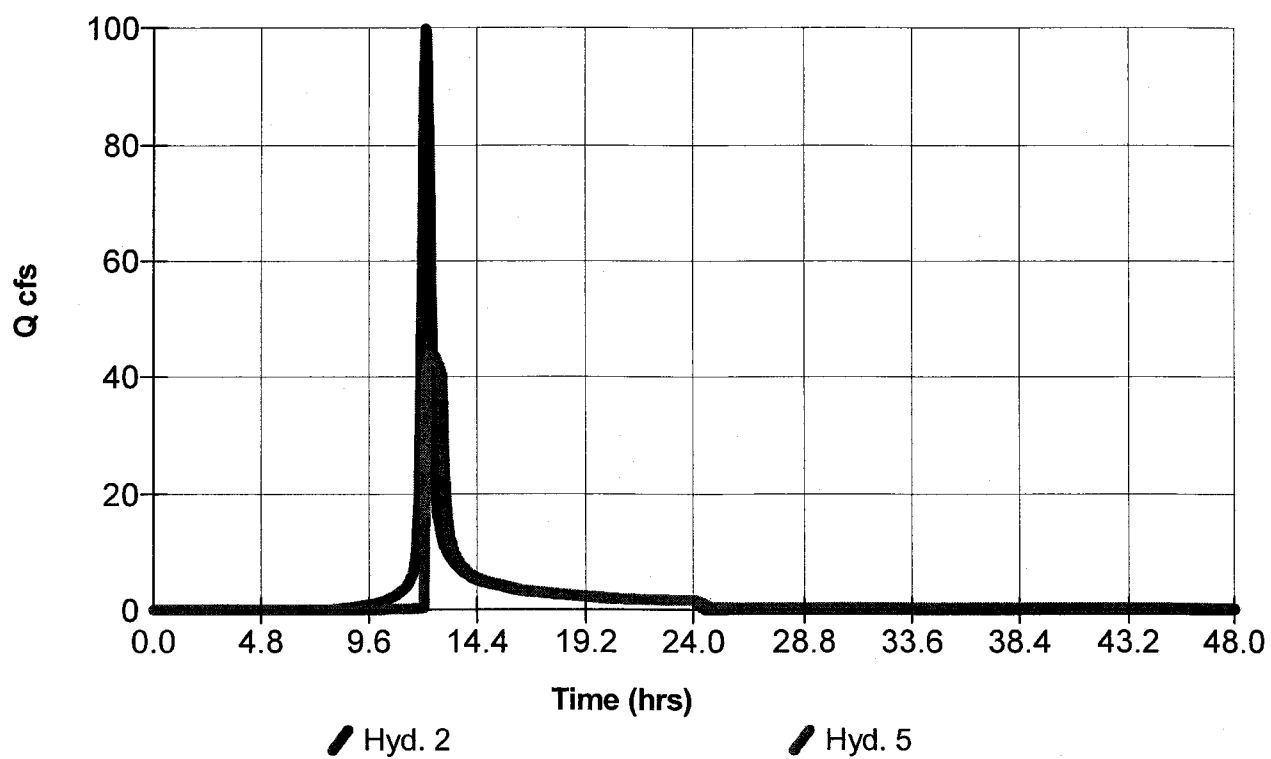
Hyd. No. 5 - Reservoir - 25 Yr -  $Q_p = 38.22$  cfs - wet pond



# Hydrograph Summary Report

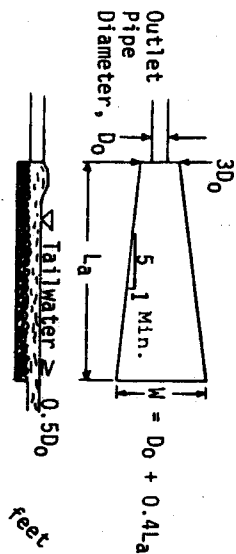
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	35.81	2	736	166,279	---	----	----	PRE-DEVELOPMENT
2	SCS Runoff	99.85	2	726	344,740	---	----	----	9069POST-DEVELOPMENT
5	Reservoir	43.82	2	744	304,675	2	81.99	192,827	wet pond
Proj. file: bmp#1.GPW			Return Period: 100 yr				Run date: 12-22-2003		

Hyd. No. 5 - Reservoir - 100 Yr -  $Q_p = 43.82$  cfs - wet pond



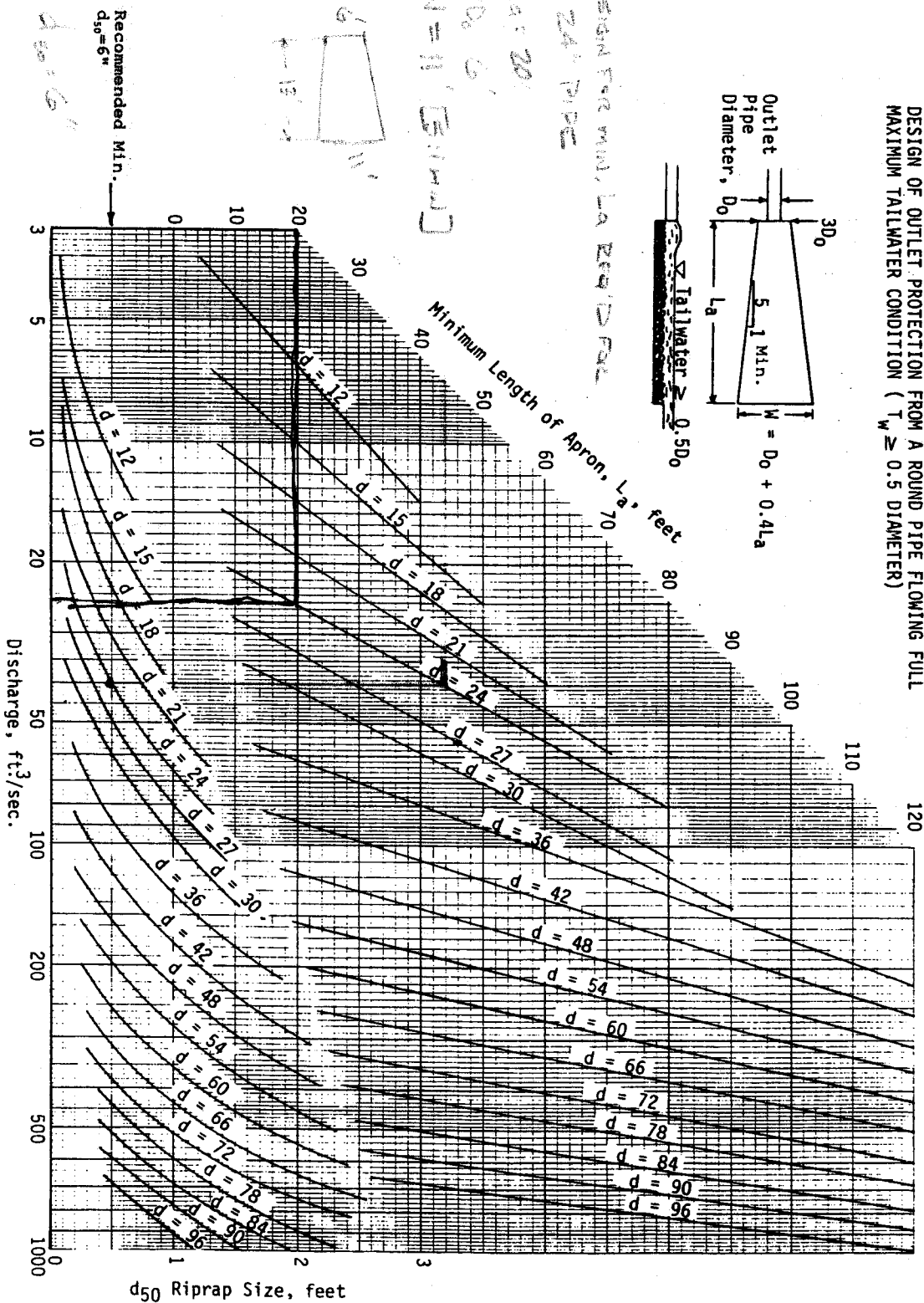
BMP #1 OUTLET PROTECTION 10 YEAR STORM 0.2580 cfs

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL  
MAXIMUM TAILWATER CONDITION ( $T_w \geq 0.5$  DIAMETER)



DESIGN FOR MIN. LA BEYOND FOR  
A 24" PIPE

La: 20'  
30.6'  
W = 11' [MIN.]



We do not allow  $d_{50} = 6"$

**Windsormeade Marketplace**  
**BMP #1**  
**BOUYANCE CALCULATIONS**  
December 19, 2003

**Note: THESE CALCULATIONS PROVIDED ARE TO INSURE THE PRINCIPAL SPILLWAY / RISER DOES NOT HAVE THE TENDENCY TO FLOAT.**

ELEVATION OF RISER CREST =

80.2 ✓

ELEVATION OF INVERT OF RISER =

77.7

72.72

AREA OF INSIDE DIMENSION OF RISER  
(Diameter = 36" riser)

7.1 square feet

OUTSIDE DIMENSION OF RISER =  
(Outside Diameter= 40")

8.7 square feet

**WEIGHT OF WATER DISPLACED BY AIR**

Inside area of Riser \* (El. Of Riser Crest - El. Of riser invert)  
\* Weight of water per cu. Ft. (62.4# / c.f.)

Weight of water displaced by air = (1 c.f. equals 62.4 Pounds)

Weight of water displaced by air 1,103 lbs.

**WEIGHT OF PRINCIPAL SPILLWAY / RISER**

(Outside area of riser - Inside area of riser) \* (El. Of Riser Crest - El. Of riser invert) \* Weight of concrete per cu. Ft. (150# / c.f.)

Weight of Concrete Riser = 598 lbs.

Weight of Grouted Section= 5,212 lbs.

Weight of Extended Base Only = 4,579 lbs.  
(Weight of Extended Base= 6.75' x 6.75' x 0.67' x 150# / c.f.)

Total Weight of Riser = 10,389 lbs. ✓

**Total Weight of Principal Spillway / Riser > Weight of Water Displaced. The riser will not float**

Note:

The weight of the spillway grate, soil, and friction of soil was not taken into account. Riser weight at this point exceeds the bouyance uplift force.

OK  
embedded



# TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project WINDSORHEDGE MARKETPLACE

Basin # 1 Location BEHIND SHOPPING CENTER

Total area draining to basin: 14.88 acres.

SHOULD BE SIZED  
FOR 20.90 ACRES  
WHICH IT WILL RECEIVE  
IN PIT 2.

## Basin Volume Design

### Wet Storage:

1. Minimum required volume = 67 cu. yds. x Total Drainage Area (acres).

$$67 \text{ cu. yds.} \times \underline{14.88} \text{ acres} = \underline{997} \text{ cu. yds.}$$

2. Available basin volume = 2434 cu. yds. at elevation 77.70. (From storage - elevation curve) ✓  
BMP ORIFICE

3. Excavate \_\_\_\_\_ cu. yds. to obtain required volume\*.

\* Elevation corresponding to required volume = invert of the dewatering orifice.

4. Available volume before cleanout required.

$$33 \text{ cu. yds.} \times \underline{14.88} \text{ acres} = \underline{491} \text{ cu. yds.}$$

5. Elevation corresponding to cleanout level = 74.27.

(From Storage - Elevation Curve)

6. Distance from invert of the dewatering orifice to cleanout level = 3.5 ft.  
(Min. = 1.0 ft.)

### Dry Storage:

7. Minimum required<sup>DET</sup> volume = 67 cu. yds. x Total Drainage Area (acres).

$$67 \text{ cu. yds.} \times \underline{14.88} \text{ acres} = \underline{997} \text{ cu. yds.}$$

8. Total available basin volume at crest of riser\* = 4920 cu. yds. at elevation 80.19. (From Storage - Elevation Curve)

\* Minimum = 134 cu. yds./acre of total drainage area.

9. Diameter of dewatering orifice = 3 in. DESIGNED WITH BAFES CHECKED AND DOES NOT DECREASE DRAIN DRAIN TIME
10. Diameter of flexible tubing = 5 in. (diameter of dewatering orifice plus 2 inches).

### Preliminary Design Elevations

11. Crest of Riser = 80.19 ✓
- Top of Dam = 84.00 ✓
- Design High Water = 80.96 ✓  
25 YEAR
- Upstream Toe of Dam = 72.00 ✓

### Basin Shape

12.  $\frac{\text{Length of Flow}}{\text{Effective Width}} = \frac{L}{We} = \frac{165}{80} =$

If  $> 2$ , baffles are not required 2.1

If  $< 2$ , baffles are required \_\_\_\_\_

### Runoff

13.  $Q_2 =$  5.41 cfs (From Chapter 5)
14.  $Q_{25} =$  44.73 cfs (From Chapter 5)

### Principal Spillway Design

15. With emergency spillway, required spillway capacity  $Q_p = Q_2 =$  \_\_\_\_\_ cfs. (riser and barrel)

Without emergency spillway, required spillway capacity  $Q_p = Q_{25} =$  44.73 cfs. (riser and barrel)

16. With emergency spillway:

Assumed available head (h) = \_\_\_\_\_ ft. (Using  $Q_2$ )

$h$  = Crest of Emergency Spillway Elevation - Crest of Riser Elevation

Without emergency spillway:

Assumed available head (h) = .77 ft. (Using  $Q_{25}$ )

$h$  = <sup>80.96</sup> Design High Water Elevation - <sup>80.19</sup> Crest of Riser Elevation

17. Riser diameter ( $D_r$ ) = 36 in. Actual head (h) = 1.9 ft.

(From Plate 3.14-8.)

Note: Avoid orifice flow conditions.

18. Barrel length (l) = 61 ft.

Head (H) on barrel through embankment = 9 ft.

(From Plate 3.14-7).

19. Barrel diameter = 24 in. ✓

(From Plate 3.14-B [concrete pipe] or Plate 3.14-A [corrugated pipe]).

20. Trash rack and anti-vortex device

Diameter = 54 inches.

Height = 17 inches.

(From Table 3.14-D).

### Emergency Spillway Design

NOT REQUIRED

Need token  
spillway.

21. Required spillway capacity  $Q_e = Q_{25} - Q_p =$  \_\_\_\_\_ cfs.
22. Bottom width (b) = \_\_\_\_\_ ft.; the slope of the exit channel (s) = \_\_\_\_\_ ft./foot; and the minimum length of the exit channel (x) = \_\_\_\_\_ ft.

(From Table 3.14-C).

Anti-Seep Collar Design

23. Depth of water at principal spillway crest (Y) = 9 ft.  
Slope of upstream face of embankment (Z) = 3 :1.  
Slope of principal spillway barrel ( $S_b$ ) = 1.18 %  
Length of barrel in saturated zone ( $L_s$ ) = 35 ft.
24. Number of collars required = 2 dimensions = 6' x 6'  
(from Plate 3.14-12).

Final Design Elevations

25. Top of Dam = 84.00 ✓  
Design High Water = 80.96 ✓  
Emergency Spillway Crest =         
Principal Spillway Crest = 80.19  
Dewatering Orifice Invert = 77.70  
Cleanout Elevation = 74.27  
Elevation of Upstream Toe of Dam  
or Excavated Bottom of "Wet Storage  
Area" (if excavation was performed) = 73.0

**STORAGE ELEVATION TABLE  
FOR SEDIMENT BASIN 2  
WINDSORMEADE MARKETPLACE  
AES Project No.:9069-02  
December 20, 2003**

**PROPOSED ESTIMATED POND(S) VOLUME**

<u>Elevation</u>	<u>Depth</u>	<u>Area</u> (sq. ft.)	<u>Incremental Volume</u> (cu. ft.)	<u>Inc. Volume</u> (cu. yd.)	<u>Sum</u> <u>Volume</u> (cu. ft.)	<u>Sum</u> <u>Volume</u> (cu. yd.)
85	0	6743	0	0	0	0
86	1	7,390	7,067	262	7,067	262
87	1	8,072	7,731	286	14,798	548
88	1	8,765	8,419	312	23,216	860
89	1	9,490	9,128	338	32,344	1,198
90	1	10,238	9,864	365	42,208	1,563

# TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project WINDSOR MEADS MARKET PLACE

Basin # 2 Location FRONT OF SITE

Total area draining to basin: 5.39 acres.

## Basin Volume Design

### Wet Storage:

1. Minimum required volume = 67 cu. yds. x Total Drainage Area (acres).

$$67 \text{ cu. yds.} \times \underline{5.39} \text{ acres} = \underline{361} \text{ cu. yds.}$$

2. Available basin volume = 361 cu. yds. at elevation 86.35. (From storage - elevation curve)

3. Excavate \_\_\_\_\_ cu. yds. to obtain required volume\*.

\* Elevation corresponding to required volume = invert of the dewatering orifice.

4. Available volume before cleanout required.

$$33 \text{ cu. yds.} \times \underline{5.39} \text{ acres} = \underline{178} \text{ cu. yds.}$$

5. Elevation corresponding to cleanout level = 85.50.

(From Storage - Elevation Curve)

6. Distance from invert of the dewatering orifice to cleanout level = .85 ft.  
(Min. = 1.0 ft.)

10"

### Dry Storage:

7. Minimum required volume = 67 cu. yds. x Total Drainage Area (acres).

$$67 \text{ cu. yds.} \times \underline{5.39} \text{ acres} = \underline{361} \text{ cu. yds.}$$

1992

3.14

TOTAL VOLUME

8. Total available basin volume at crest of riser\* = 722 cu. yds. at elevation 87.55. (From Storage - Elevation Curve) ✓

\* Minimum = 134 cu. yds./acre of total drainage area.

9. Diameter of dewatering orifice = 3 in. MIN ✓
10. Diameter of flexible tubing = 5 in. (diameter of dewatering orifice plus 2 inches). ✓

### Preliminary Design Elevations

11. Crest of Riser = 87.55
- Top of Dam = 90.50
- Design High Water = 88.35
- Upstream Toe of Dam = 86.00

### Basin Shape

12.  $\frac{\text{Length of Flow}}{\text{Effective Width}} = \frac{L}{W_e} = \underline{2}$

If  $> 2$ , baffles are not required ✓

If  $< 2$ , baffles are required \_\_\_\_\_

### Runoff

13.  $Q_2 = \underline{\hspace{2cm}}$  cfs (From Chapter 5)
14.  $Q_{25} = \underline{70.69}$  cfs (From Chapter 5)

### Principal Spillway Design

15. With emergency spillway, required spillway capacity  $Q_p = Q_2 = \underline{\hspace{2cm}}$  cfs. (riser and barrel)

Without emergency spillway, required spillway capacity  $Q_p = Q_{25} = \underline{70.69}$  cfs. (riser and barrel)

16. With emergency spillway:

Assumed available head (h) = \_\_\_\_\_ ft. (Using  $Q_2$ )

$h$  = Crest of Emergency Spillway Elevation - Crest of Riser Elevation

Without emergency spillway:

Assumed available head (h) = 0.8 ft. (Using  $Q_{25}$ )

$h$  = Design High Water Elevation - Crest of Riser Elevation

17. Riser diameter ( $D_r$ ) = 36 in. Actual head (h) = 0.8 ft.

(From Plate 3.14-8.)

Note: Avoid orifice flow conditions.

18. Barrel length (l) = 148 ft.

Head (H) on barrel through embankment = 3.5 ft.

(From Plate 3.14-7).

19. Barrel diameter = 24 in.

(From Plate 3.14-B [concrete pipe] or Plate 3.14-A [corrugated pipe]).

20. Trash rack and anti-vortex device

Diameter = 42 inches.

Height = 13 inches.

(From Table 3.14-D).

### Emergency Spillway Design

NOT REQUIRED

21. Required spillway capacity  $Q_e = Q_{25} - Q_p =$  \_\_\_\_\_ cfs.

22. Bottom width (b) = \_\_\_\_\_ ft.; the slope of the exit channel (s) = \_\_\_\_\_ ft./foot; and the minimum length of the exit channel (x) = \_\_\_\_\_ ft.

(From Table 3.14-C).



Anti-Seep Collar Design

NOT REQUIRED

23. Depth of water at principal spillway crest (Y) = \_\_\_\_ ft.  
 Slope of upstream face of embankment (Z) = \_\_\_\_:1.  
 Slope of principal spillway barrel ( $S_b$ ) = \_\_\_\_ %  
 Length of barrel in saturated zone ( $L_s$ ) = \_\_\_\_ ft.
24. Number of collars required = \_\_\_\_ dimensions = \_\_\_\_  
 (from Plate 3.14-12).

Final Design Elevations

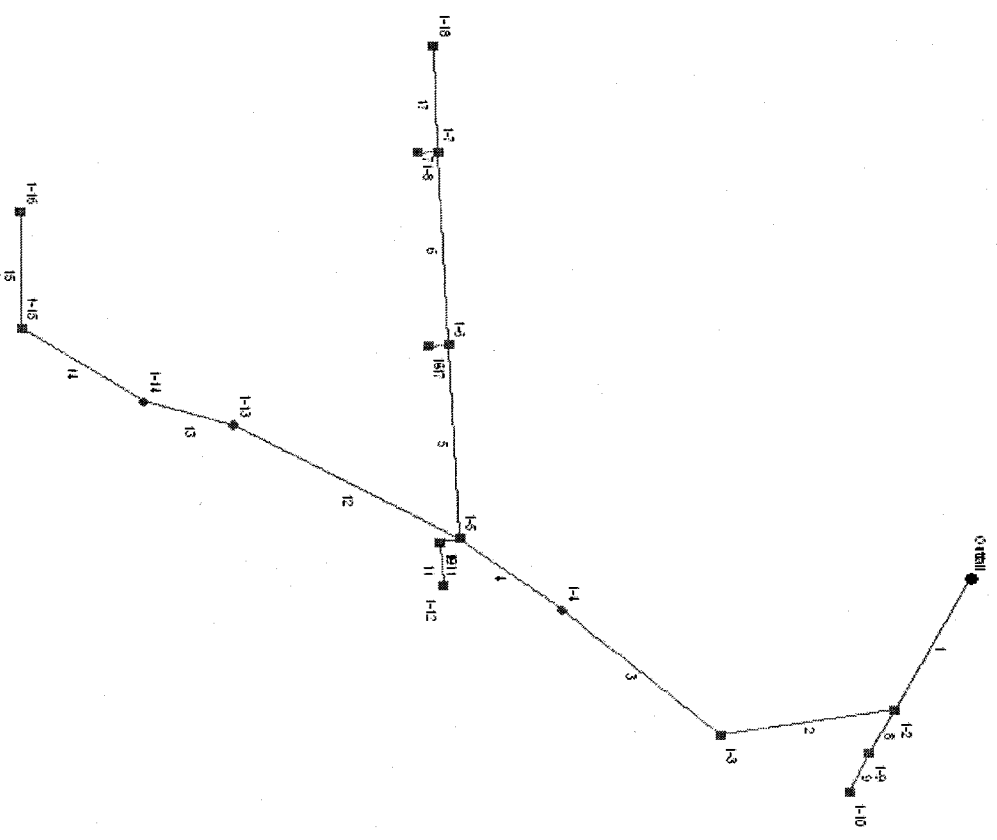
25. Top of Dam = 90.50 ✓  
 Design High Water = 88.35 ✓  
 Emergency Spillway Crest = \_\_\_\_  
 Principal Spillway Crest = 87.55  
 Dewatering Orifice Invert = 86.35  
 Cleanout Elevation = 85.35

Elevation of Upstream Toe of Dam  
 or Excavated Bottom of "Wet Storage  
 Area" (if excavation was performed) = 86.00

$$\begin{array}{r} 88.35 \\ 2 \\ \hline 90.35 \end{array}$$

System #1  
Hydraflow Plan View

Storm Comps.



Project file: stormsystem#1.stm

No. Lines: 17

12-22-2003

# Storm Sewer Tabulation

Station	To Line	Len (ft)	Drng Area		Rooft Coeff (C)	Area x C		Tc		Rain (l)	Total Flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
			Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	192.0	1.11	16.49	0.90	1.00	14.72	5.0	10.1	5.9	86.41	106.2	6.88	48	0.55	77.15	76.10	81.42	80.72	86.50	0.00	1-1 to 1-2
2	1	203.0	0.66	13.13	0.90	0.59	11.69	5.0	9.5	6.0	69.98	104.8	5.57	48	0.53	78.23	77.15	82.82	82.33	90.00	86.50	1-2 to 1-3
3	2	243.0	0.00	12.47	0.90	0.00	11.10	5.0	8.8	6.1	68.05	101.8	5.42	48	0.50	79.45	78.23	83.89	83.35	91.00	90.00	1-3 to 1-4
4	3	149.0	1.63	12.47	0.90	1.47	11.10	5.0	8.3	6.2	69.07	101.9	5.50	48	0.50	80.20	79.45	84.31	83.96	88.29	91.00	1-4 to 1-5
5	4	252.0	1.25	6.62	0.90	1.13	5.83	5.0	7.5	6.4	37.29	47.16	5.28	36	0.50	81.46	80.20	85.61	84.82	87.80	88.29	1-5 to 1-6
6	5	252.0	1.14	3.22	0.90	1.03	2.77	5.0	5.9	6.8	18.75	47.16	2.65	36	0.50	82.72	81.46	86.46	86.26	88.10	87.80	1-6 to 1-7
7	6	24.0	1.46	1.46	0.90	1.31	1.31	5.0	5.0	7.0	9.19	38.63	2.93	24	2.92	83.42	82.72	86.66	86.62	88.10	88.10	1-7 to 1-8
8	1	64.0	1.80	2.25	0.90	1.62	2.03	5.0	5.4	6.9	13.95	38.45	4.44	24	2.89	79.00	77.15	82.58	82.33	85.50	86.50	1-8 to 1-9
9	8	56.0	0.45	0.45	0.90	0.41	0.41	5.0	5.0	7.0	2.83	8.63	2.31	15	1.79	80.00	79.00	82.84	82.73	86.50	85.50	1-9 to 1-10
10	4	24.0	1.25	1.86	0.90	1.13	1.67	5.0	5.3	6.9	11.58	40.51	3.68	24	3.21	80.97	80.20	84.89	84.82	88.29	88.29	1-10 to 1-11
11	10	58.0	0.61	0.61	0.90	0.55	0.55	5.0	5.0	7.0	3.84	13.22	3.13	15	4.19	83.40	80.97	85.41	85.20	89.40	88.29	1-11 to 1-12
12	4	300.0	0.00	2.36	0.90	0.00	2.12	5.0	6.8	6.6	13.94	19.24	4.44	24	0.72	82.37	80.20	85.96	84.82	91.50	88.29	1-12 to 1-13
13	12	109.0	0.00	2.36	0.90	0.00	2.12	5.0	6.4	6.7	14.14	15.92	4.50	24	0.50	82.91	82.37	86.53	86.10	93.50	91.50	1-13 to 1-14
14	13	170.0	0.66	2.36	0.90	0.59	2.12	5.0	5.7	6.8	14.46	15.99	4.60	24	0.50	83.76	82.91	87.36	86.67	90.90	93.50	1-14 to 1-15
15	14	151.0	1.70	1.70	0.90	1.53	1.53	5.0	5.0	7.0	10.70	15.83	3.41	24	0.49	84.50	83.76	88.11	87.77	89.60	90.90	1-15 to 1-16
16	5	24.0	2.15	2.15	0.90	1.94	1.94	5.0	5.0	7.0	13.54	39.18	4.31	24	3.00	82.18	81.46	86.35	86.26	87.80	87.80	1-16 to 1-17
17	6	138.0	0.62	0.62	0.70	0.43	0.43	5.0	5.0	7.0	3.04	8.30	2.47	15	1.65	85.00	82.72	86.93	86.62	89.00	88.10	1-17 to 1-18

Project File: stormsystem#1.stm

Number of lines: 17

Run Date: 12-22-2003

NOTES: Intensity = 140.36 / (inlet time + 19.80) ^ 0.93. Return period = 10 Yrs.

100%



**F&S**  
CONSULTING ENGINEERS

PROJECT  
PROJECT NO  
SUBJECT  
SHEET NO.  
DATE  
BY

WINDSORMEADE MARKETPLACE  
9069  
Spread Calc's  
1  
#####  
BWS

# STORM WATER INLET COMPUTATIONS

[illegible]



**PROJECT  
PROJECT NO.  
SUBJECT  
SHEET NO.**

BWS

## BWS

[illegible]



5248 Olde Towne Road, Suite 1  
Williamsburg, Virginia 23188  
(757) 253-0040  
Fax: (757) 220-8994

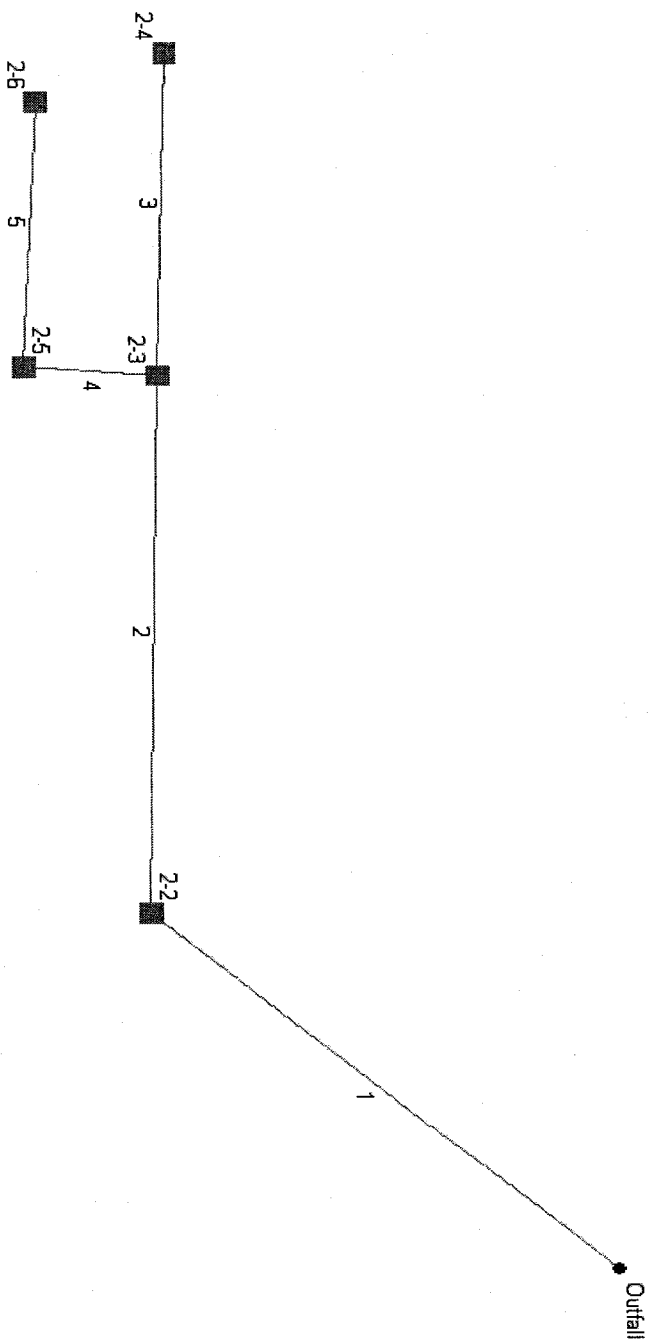
PROJECT  
PROJECT NO.  
SUBJECT  
SHEET NO.  
DATE  
BY

**Spread Calc's**  
**1**  
**BWS**

# STORM WATER INLET COMPUTATIONS

[illegible]

# SYSTEM #2 Hydraflow Plan View



Project file: stormsystem#2.stm

No. Lines: 5

12-23-2003

# Storm Sewer Tabulation

Station	Line	Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
			Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	139.0	0.73	2.64	0.90	0.66	2.38	5.0	6.6	6.6	15.69	21.75	5.00	24	0.66	78.62	77.70	81.23	80.75	89.62	79.70	2-1 to 2-2
2	1	163.0	0.39	1.91	0.90	0.35	1.72	5.0	5.8	6.8	11.65	20.19	3.71	24	0.57	79.55	78.62	81.97	81.66	86.00	89.62	2-2 to 2-3
3	2	97.0	0.72	0.72	0.90	0.65	0.65	5.0	5.0	7.0	4.53	5.20	3.69	15	0.46	80.00	79.55	82.63	82.29	84.50	86.00	2-3 to 2-4
4	2	36.0	0.44	0.80	0.90	0.40	0.72	5.0	5.7	6.8	4.90	18.17	4.63	15	0.67	81.59	79.55	82.48	82.29	88.00	86.00	2-4 to 2-5
5	4	80.0	0.36	0.36	0.90	0.32	0.32	5.0	5.0	7.0	2.27	5.46	1.86	15	0.51	82.00	81.59	83.19	83.12	86.30	88.00	2-5 to 2-6

Project File: stormsystem#2.stm

Number of lines: 5

Run Date: 12-23-2003

NOTES: Intensity = 140.36 / (inlet time + 19.80) ^ 0.93; Return period = 10 Yrs.



SYSTEM #2 SPREAD CALC USING K<sub>s</sub> = 6.4 in/hr LBSK REQUIREMENTS



5248 Old Towne Road, Suite 1  
Williamsburg, Virginia 23188  
(757) 253-0040  
Fax: (757) 220-8994

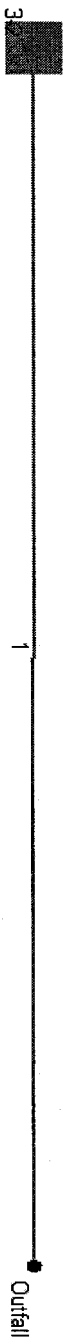
PROJECT WINDSORMEADE MARKETPLACE  
SUBJECT #####  
SHEET NO. Spread Calc's  
DATE 1  
BY #####  
BWS

# STORM WATER INLET COMPUTATIONS

INLET			Station	Drainage Area (Ac)	C	CA	Σ CA	I in/hr	Q-Inter (CFS)	Q Carry-Over (CFS)	Qt Gutter Flow	S Gutter Slope (ft/ft)	Sx Cross Slope (ft/ft)	T(Spread)	W (ft)	W/T	Sw (ft/ft)	Sw/Sx	Eo(#10)	n	Local Dep.	a	S'w = a/(12W)	Se (ft/ft) = Sx+SwEo	Lt (ft) 15 P Effect L	L/Lt (ft)	E(#16) (ft)	Q Int CFS d/h	Q Carryover Spread	Remark
Number	Type	Length																												
SS2-2	DI-2B	8		0.73	0.9	0.657	0.657	6.4	4.205	0	4.205	0.01	0.02	10.5	2	0.19	0.08	4	0.51	0.015	2	3.44	0.143	0.093	14.23	0.562	0.774	3.254	0.951	
SS2-3	DI-2B	8		0.39	0.9	0.351	0.351	6.4	2.246	0.951	3.197	0.01	0.02	9.3	2	0.215	0.08	4	0.564	0.015	2	3.44	0.143	0.101	12.09	0.662	0.858	2.743	0.454	
SS2-5	DI-2B	8		0.44	0.9	0.396	0.396	6.4	2.534	0	2.534	0.01	0.02	8.7	2	0.23	0.08	4	0.599	0.015	2	3.44	0.143	0.106	10.65	0.751	0.918	2.327	0.207	
SS2-6	DI-2B	8		0.32	0.9	0.288	0.288	6.4	1.843	0	1.843	0.01	0.02	7.7	2	0.26	0.08	4	0.634	0.015	2	3.44	0.143	0.111	9.058	0.883	0.979	1.805	0.039	
SS2-4	DI-2B	14		0.72	0.9	0.648	0.648	6.4	4.147	0.7	4.847	0.01	0.02	11.1	2	0.18	0.08	4	0.51	0.015	2	3.44	0.143	0.093	15.1	0.927	0.991	4.803	0.044	

SYSTEM # 3

Hydraflow Plan View



Project file: stormsystem#3.stm

No. Lines: 1

12-22-2003

## Page 1

Hydraflow Storm Sewers 2003



James City County Environmental Division  
Stormwater Management / BMP Inspection Report  
Detention and Retention Pond Facilities

SP-150-03

County BMP ID Code (if known): PC 203

Name of Facility: Windsor Meade Marketplace BMP No.: 1 of 1 Date: 9/22/16

Location: \_\_\_\_\_

Name of Owner: \_\_\_\_\_

Name of Inspector: \_\_\_\_\_

Type of Facility: Wet EXT EXT POND

Weather Conditions: Sunny, Warm 70 Type: ☒ Final Inspection ☐ County BMP Inspection Program ☐ Owner Inspection

If an inspection item is not applicable, mark NA, otherwise mark the appropriate column.

O.K. - The item checked is in adequate condition and the maintenance program is currently satisfactory. No action required.

Routine - The item checked requires attention, but does not present an immediate threat to the function/integrity of the BMP.

Urgent - The item checked requires immediate attention to keep the BMP operational and to prevent damage to the facility.

Provide an explanation and details in the comment column, if routine or urgent are marked.

Facility Item	O.K.	Routine	Urgent	Comments
<b>Embankments and Side Slopes:</b> <u>Earth Dam, 8-10 wide; 2H:1V</u>				
Grass Height	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<u>Very little grass</u>
Vegetation Condition	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<u>Bare Soil on dam</u>
Tree Growth	<input checked="" type="checkbox"/>			<u>None, Landscaping present.</u>
Erosion	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<u>Surface erosion</u>
Trash & Debris	<input checked="" type="checkbox"/>			
Seepage	<input checked="" type="checkbox"/>			<u>Looks ok.</u>
Fencing or Benches				
<b>Interior Landscaping/Planted Areas:</b> <input checked="" type="checkbox"/> None <input type="checkbox"/> Constructed Wetland/Shallow Marsh <input type="checkbox"/> Naturally Established Vegetation				
Vegetated Conditions	<input checked="" type="checkbox"/>			
Trash & Debris	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<u>needs stabilized.</u>
Floating Material	<input checked="" type="checkbox"/>			
Erosion	<input checked="" type="checkbox"/>			
Sediment	<input checked="" type="checkbox"/>			
Dead Plant	<input checked="" type="checkbox"/>			
Aesthetics	<input checked="" type="checkbox"/>			<u>Looks ok</u>
Other				<u>Geese</u>
Notes: <u>Grass Bldg + Parking</u>				

Facility Item	O.K.	Routine	Urgent	Comments
<b>Water Pools:</b> <input checked="" type="checkbox"/> Permanent Pool (Retention Basin) <input type="checkbox"/> Shallow Marsh (Detention Basin) <input type="checkbox"/> None, Dry (Detention Basin)				
Shoreline Erosion	✓			
Algae	✓			Some
Trash & Debris	✓	✓		Remove trash in NW corner.
Sediment	✓			
Aesthetics	✓			
Other	✓			
<b>Inflows (Describe Types/Locations):</b> #1) 48" CPP West; #2) 36" SW corner #3) small 12"				
Condition of Structure	✓			
Erosion	✓			
Trash and Debris		✓	✓	Clean outfall Pipe #2
Sediment		✓	✓	from veg obstruction.
Outlet Protection	✓			
Other				
<b>Principal Flow Control Structure - Riser, Intake, etc. (Describe Type):</b> 48" RCP w/ CMP CAP; 36" outfall				
Condition of Structure	✓			Need
Corrosion	✓			
Trash and Debris		✓	✓	clean debris, trash around riser
Sediment	✓			LFO.
Vegetation	✓			
Other		✓	✓	CLEAN LOW FLOW Bx for job w/ entrance
<b>Principal Outlet Structure - Barrel, Conduit, etc.:</b> 36" RCP, ES-1				
Condition of Structure	✓			
Settlement	✓			
Trash & Debris		✓	✓	Clean outfall of veg, rock & debris
Erosion/Sediment		✓	✓	Remove catail
Outlet Protection				12x25 class I, forebay 1'
Other				
<b>Emergency Spillway (Overflow):</b> concrete, 10' w 2:1; 2' deep				
Vegetation	✓			
Lining	✓			concrete
Erosion	✓			
Trash & Debris	✓			
Other			✓	Fence obstructs E.S.
Notes:				

93.7  
82.9  
-----  
10.8'

Facility Item	O.K.	Routine	Urgent	Comments
<b>Nuisance Type Conditions:</b>				
Mosquito Breeding	✓			
Animal Burrows	✓			
Graffiti	✓			
Other				
<b>Surrounding Perimeter Conditions:</b> <i>CHAIN LINK FENCE North Woods, South BUDG, EAST, WEST</i>				
Land Uses	✓			
Vegetation	✓			
Trash & Debris	✓	✓	✓	<i>BAGS OF concrete SW corner.</i>
Aesthetics				
Access /Maintenance Roads or Paths			✓	<i>Access Road incomplete GUIDE RAIL MISSING</i>
Other			✓	<i>Guide Rail</i>
<b>Remarks:</b> <ul style="list-style-type: none"> <li><i>No signs of piping</i></li> <li><i>Need hatch + lock on riser.</i></li> <li><i>Guide rail</i></li> <li><i>Needs Locks on perimeter fence (two points)</i></li> <li><i>clean concrete chunk from inlet #1-2</i></li> </ul>				
<b>Overall Environmental Division Internal Rating:</b> <i>2/3</i>				
<b>Signature:</b> <i>[Signature]</i>		<b>Date:</b> <i>9/22/06</i>		
<b>Title:</b> <i>Chief SW Engineer</i>				

SWMPProg\BMP\CoInspProg\InspForms\DetRet.wpd

*Reinspected 11-5-07  
Jason Beck OKAY*

**Scott Thomas**

---

**From:** Scott Thomas  
**Sent:** Wednesday, October 11, 2006 5:24 PM  
**To:** 'rhett@ashlandconstruction.com'  
**Cc:** 'Arch Marston'; 'MGalli'; Joan Etchberger  
**Subject:** Wet Pond BMP at WindsorMeade Marketplace

***Rhett – As you a fighting a bond renewal deadline, I am emailing you this correspondence by email rather than my usual method by letterhead through the mail..***

Date: October 11, 2006

To: Mr. Rhett Moody  
Ashland Construction

Re: WindsorMeade Marketplace  
County Plan No. SP-150-03 (Amends SP-2-05)  
County BMP ID Code: PC 203

Dear Moody:

The Environmental Divisions has received a record drawing (asbuilt) and construction certification for the stormwater management facility for the above referenced project. The record drawing provides as-built information for a wet extended detention pond in the back, northwest corner of the site. Based on our review of the project and a concurrent field inspection as performed on September 22, 2006 the following items must be addressed prior to release of the developer's surety instrument for the stormwater management/BMP facility at the site and to proceed with closing out the project:

**Record Drawing:**

1. The record drawing set dated March 1, 2006 is **satisfactory**. Please forward one additional blue/black line and one reproducible of the record drawing set to our office.

**Construction Certification:**

2. The construction certification dated May 3, 2006 is **satisfactory**.

**Construction - Related Items:**

3. Stabilize all bare soil and erosion areas present on the dam and within the interior graded sideslopes. Most of the top of dam and downstream embankment and the south interior graded pond slope were not in an acceptable stabilized condition.
4. Clean and remove all debris, trash and minor sediments from around the low flow orifice pipe on the principal spillway device. This would be at the end of the 6-inch pipe which extends out from the riser.
5. Remove trash and debris in the northwest corner of the basin, approximately 50 ft. west of the basin.
6. Clean and remove sediment accumulations, debris, trash and vegetation within 10 feet of the outfall end of the 36-inch storm drain pipe which enters the basin at the southeast corner. This is the pipe between storm drainage structure SS # 2-2 and SS # 2-1 on the approved plan. Flow into the basin shall not be obstructed by debris, trash, sediment or vegetation.

10/11/2006

7. Clean and remove all debris and obstruction at the outfall of the 36-inch barrel through the dam, especially obstructions within the flared end section.
8. The chain link fence around the perimeter of the facility is across and blocking the concrete emergency spillway. During high flow conditions, the fence will tend to trap debris which could raise the water surface elevation of the pond above that intended which could result in overtopping. Based on design information, depth of flow in the emergency spillway for the 100-year event would be at least 0.70 feet deep in the spillway; therefore, the fence should be cut about 1 foot.
9. Clean and remove debris (unused bags of concrete) in the southwest corner of the site.
10. The access road for BMP maintenance, as proposed in the southwest corner of the site, is incomplete and not installed per the approved design plan.
11. Guard rail, as proposed along the back service road between the road and the BMP area, was not installed per the approved plan.
12. The principal spillway device (riser) had no entry, access hatch or lid. It is impossible to inspect or maintain the riser without proper access.
13. To prevent unauthorized access, padlocks should be added to the two gate structures on the perimeter fence around the BMP area. Provide an extra set of keys or combination for the locks to the Environmental Division office.

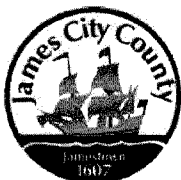
Once this work is satisfactorily completed, contact our office appropriately for a re-inspection. We can then proceed with final release of the surety and/or closing out the project. Please contact me at 757-253-6639 or the assigned Environmental Division inspector, Mr. Jason Beck 757-259-4026 if you have any further comments or questions.

**Scott J. Thomas, P.E.**  
*Chief Engineer - Stormwater*  
*James City County*  
*Environmental Division*

cc: Arch Marson - via email  
Mike Galli - via email

10/11/2006





**James City County Environmental Division  
Stormwater Management/BMP Record Drawing &  
Construction Certification Review  
Tracking Form**

Project Name: WINDSOR MOORE MARKETPLACE  
County Plan No.: SP-150-03 (AMEND SP-2-05)  
Stormwater Management Facility: WET EXT DET POND  
BMP Phase #: ☐ I ☐ II ☒ III  
☒ Information Package Received. Date/By: JULY 21 '06 AES  
☒ Completeness Check:  
☒ Record Drawing Date/By: MARCH 01 2006 AES  
☒ Construction Certification Date/By: ECS 5/3/06  
☒ RD/CC Standard Forms (Required for all BMPs after Feb 1<sup>st</sup> 2001 Only)  
☒ Insp/Maint Agreement # / Date: # 040021396 Aug 23 2004  
☒ BMP Maintenance Plan Location: SHEET 14, RECORD DRAWING  
☐ Other: \_\_\_\_\_  
☒ Standard E&SC Note on Approved Plan Requiring RD/CC or County comment in plan review  
☒ Yes ☐ No Location: SHEET 12  
☒ Assign County BMP ID Code #: Code: PC 203  
☒ Preliminary Input/Log into Division's "As-Built Tracking Log"  
☒ Add Location to GIS Map. Obtain basic site information (GPIN, Owner, Address, etc.)  
☒ Preliminary Log into Access Database (BMP ID #, Plan No., GPIN, Project Name, etc.)  
☒ Active Project File Review (correspondence, H&H, design computations, etc.)  
☒ Initial As-Built File setup (File label, folder, copy plan/details/design information, etc.)  
☒ Inspector Check of RD/CC (forward to Inspector using transmittal for cursory review).  
☒ Pre-Inspection Drawing Review of Approved Plan (Quick look prior to Field Inspection).  
☒ Final Inspection (FI) Performed Date: 9/22/06  
☒ Record Drawing (RD) Review Date: 9/22/06  
☒ Construction Certification (CC) Review Date: 9/22/06  
☒ Actions:  
☐ No comments.  
☒ Comments. Letter Forwarded. Date: 10/11/06  
☐ Record Drawing (RD)  
☐ Construction Certification (CC)  
☒ Construction-Related (CR)  
☐ Site Issues (SI)  
☐ Other: \_\_\_\_\_  
☐ Second Submission: NA  
☒ Reinspection (if necessary): 11/5/07  
☒ Acceptable for SWM Purposes (RD/CC/CR/Other). Ok to proceed with bond release.  
☒ Complete "Surety Request Form".  
☒ Check/Clean active file of any remaining material and finish "As-Built" file.  
☒ Add to County BMP Inventory/Inspection schedule (Phase I, II or III).  
☒ Copy Final Inspection Report into County BMP Inspection Program file.  
☒ Obtain Digital Photographs of BMP and save into County BMP Inventory.  
☒ Request mylar/reproducible from As-Built plan preparer.  
☒ Complete "As-built Tracking Log".  
☒ Last check of BMP Access Database (County BMP Inventory).  
☐ Add BMP to JCC Hydrology & Hydraulic database (optional).  
☐ Add BMP to Municipal BMP list (if a County-owned facility).  
☒ Add BMP to PRIDE BMP ratings database. problem with program

**Final Sign-Off**

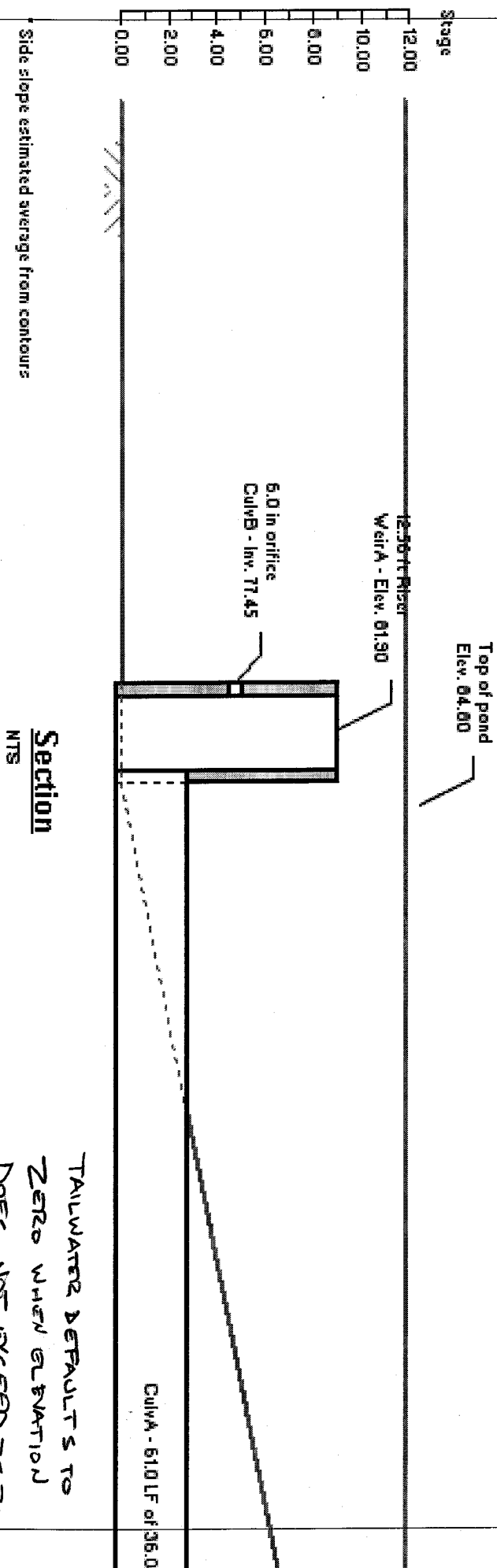
Plan Reviewer: Jason Ball

Date: 11/7/07

\*\*\* See separate checklist, if needed.

REVISION TO BMP # 1 FOR DRAINAGE INCREASE OF 0.04K

## WET POND



# Pond Report

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:17 AM

## Pond No. 2 - WET POND

### Pond Data

Pond storage is based on known contour areas. Average end area method used.

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	73.00	6,701	0	0
1.00	74.00	12,612	9,657	9,657
2.00	75.00	13,689	13,151	22,807
3.00	76.00	14,799	14,244	37,051
4.00	77.00	15,942	15,371	52,422
5.00	78.00	22,057	19,000	71,421
6.00	79.00	27,489	24,773	96,194
7.00	80.00	29,673	28,581	124,775
8.00	81.00	31,917	30,795	155,570
9.00	82.00	34,224	33,071	188,641
10.00	83.00	36,580	35,402	224,043
11.00	84.00	38,898	37,739	261,782
11.80	84.80	40,842	31,896	293,678

### Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 36.00	6.00	0.00	0.00
Span (in)	= 36.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 72.72	77.45	0.00	0.00
Length (ft)	= 61.00	0.00	0.00	0.00
Slope (%)	= 1.18	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	Yes	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.56	10.00	0.00	0.00
Crest El. (ft)	= 81.90	82.90	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Riser	Cipiti	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

### Stage / Storage / Discharge Table

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	Civ D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	73.00	0.00	0.00	---	---	0.00	0.00	---	---	---	0.00
1.00	9,657	74.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.00	22,807	75.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.00	37,051	76.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
4.00	52,422	77.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
5.00	71,421	78.00	0.62	0.52	---	---	0.00	0.00	---	---	---	0.52
6.00	96,194	79.00	1.13	1.08	---	---	0.00	0.00	---	---	---	1.08
7.00	124,775	80.00	1.43	1.43	---	---	0.00	0.00	---	---	---	1.43
8.00	155,570	81.00	1.76	1.72	---	---	0.00	0.00	---	---	---	1.72
9.00	188,641	82.00	3.30	1.96	---	---	1.32	0.00	---	---	---	3.28
10.00	224,043	83.00	50.43	2.18	---	---	48.25	1.05	---	---	---	51.48
11.00	261,782	84.00	101.65	0.88	---	---	100.77	38.42	---	---	---	140.07
11.80	293,678	84.80	108.73	0.58	---	---	108.15	87.21	---	---	---	195.93

# Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-----	7.11	12.21	-----	-----	31.96	37.56	-----	52.98	PRE-DEVELOPMENT
2	SCS Runoff	-----	43.73	57.82	-----	-----	103.74	115.60	-----	147.05	9069POST-DEVELOPMENT
5	Reservoir	2	1.75	3.81	-----	-----	62.45	80.42	-----	121.09	wet pond
<div> <div>Proj. file: bmp#1 revised 4_23_05.GPW</div> <div>Wednesday, May 18 2005, 9:08 AM</div> </div>											

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	7.11	2	736	36,768	---	-----	-----	PRE-DEVELOPMENT
2	SCS Runoff	43.73	2	726	152,637	---	-----	-----	9069POST-DEVELOPMENT
5	Reservoir	1.75	2	902	151,398	2	81.12 <i>PREVIOUSLY 81.11</i>	159,576	wet pond
bmp#1 revised 4_23_05.GPW					Return Period: 1 Year			Wednesday, May 18 2005, 9:08 AM	

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:32 AM

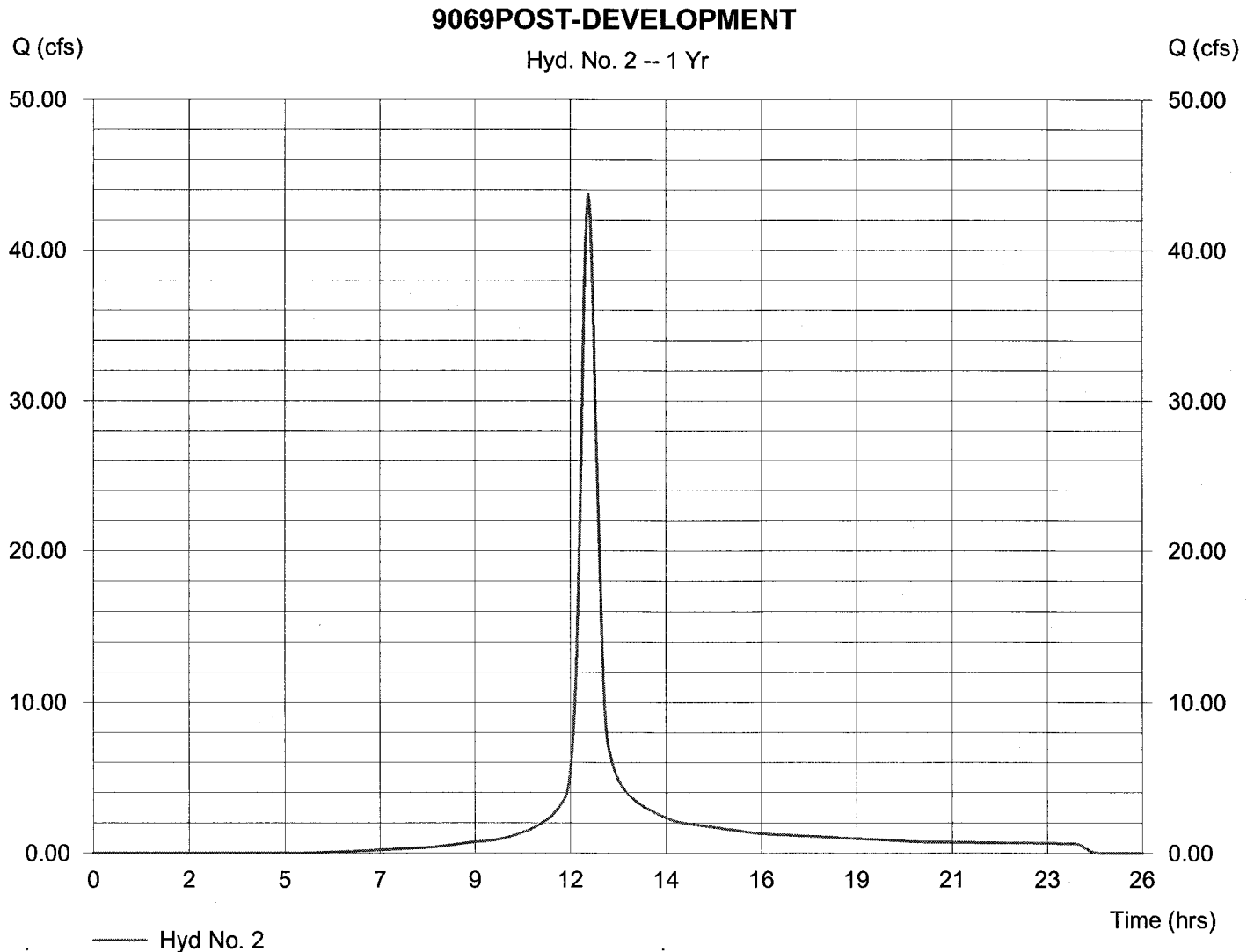
## Hyd. No. 2

### 9069POST-DEVELOPMENT

Hydrograph type = SCS Runoff  
Storm frequency = 1 yrs  
Drainage area = 20.94 ac PREVIOUSLY 22.9  
Basin Slope = 2.0 %  
Tc method = USER  
Total precip. = 2.80 in  
Storm duration = 24 hrs

Peak discharge = 43.73 cfs  
Time interval = 2 min  
Curve number = 92  
Hydraulic length = 3000 ft  
Time of conc. (Tc) = 21 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 152,637 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:28 AM

## Hyd. No. 5

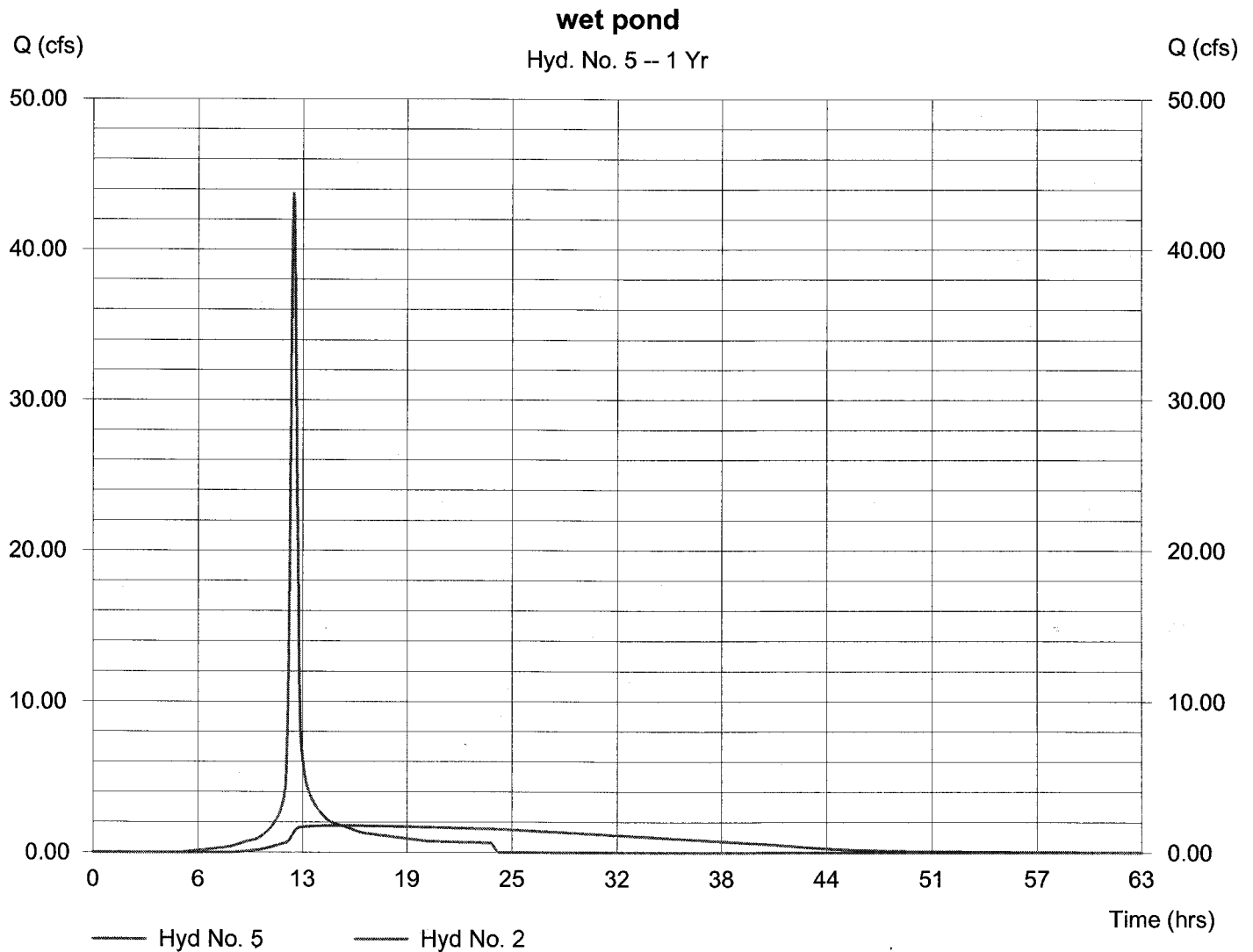
wet pond

Hydrograph type = Reservoir  
Storm frequency = 1 yrs  
Inflow hyd. No. = 2  
Reservoir name = WET POND

Peak discharge = 1.75 cfs  
Time interval = 2 min  
Max. Elevation = 81.12 ft  
Max. Storage = 159,576 cuft

Storage Indication method used. Wet pond routing start elevation = 77.40 ft.

Hydrograph Volume = 151,398 cuft



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	12.21	2	736	58,844	---	-----	-----	PRE-DEVELOPMENT
2	SCS Runoff	57.82	2	726	204,004	---	-----	-----	9069POST-DEVELOPMENT
5	Reservoir	3.81	2	812	202,670	2	82.02 NO CHANGE	189,404	wet pond
bmp#1 revised 4_23_05.GPW					Return Period: 2 Year			Wednesday, May 18 2005, 9:08 AM	



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:32 AM

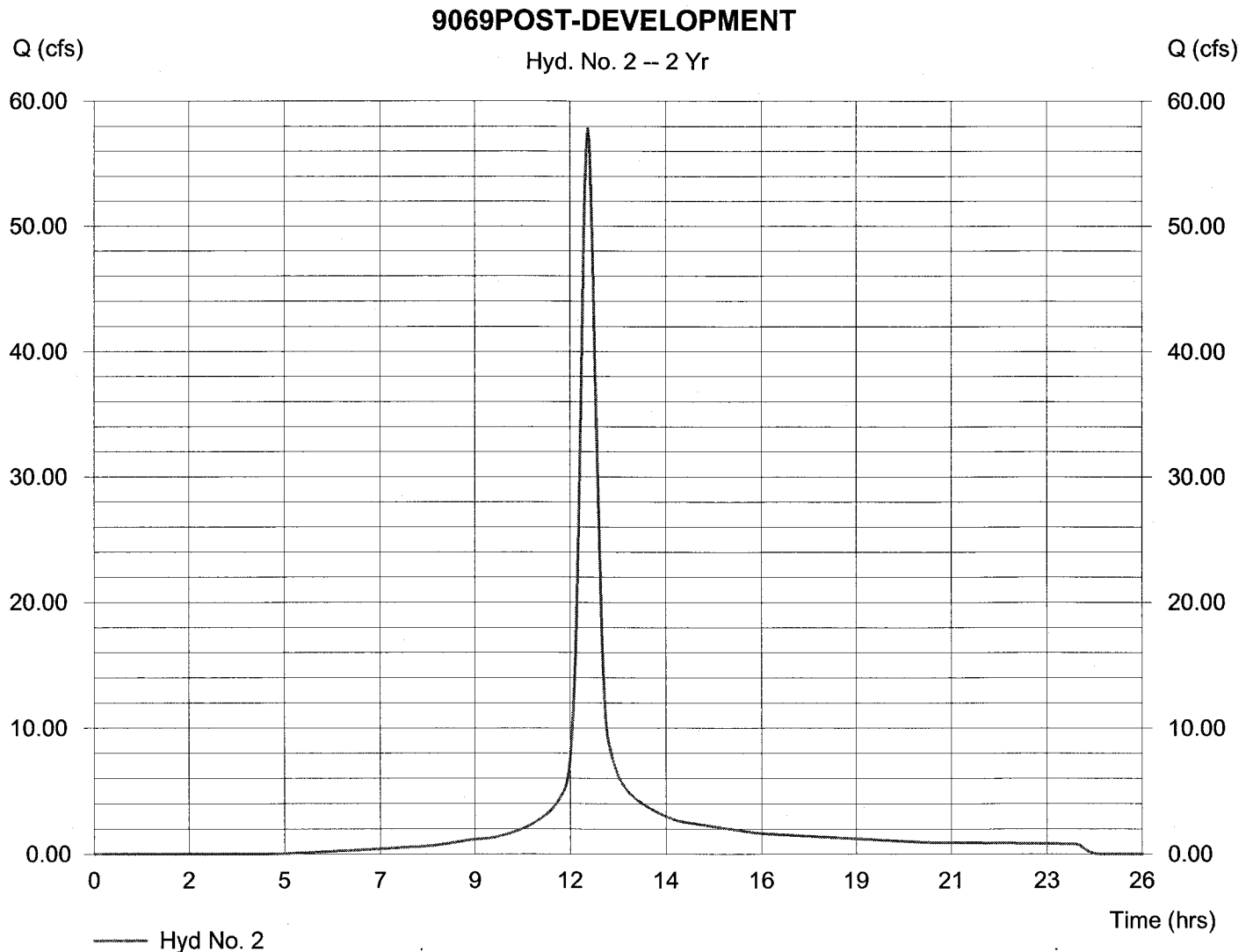
## Hyd. No. 2

### 9069POST-DEVELOPMENT

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 20.94 ac  
Basin Slope = 2.0 %  
Tc method = USER  
Total precip. = 3.50 in  
Storm duration = 24 hrs

Peak discharge = 57.82 cfs  
Time interval = 2 min  
Curve number = 92  
Hydraulic length = 3000 ft  
Time of conc. (Tc) = 21 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 204,004 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:28 AM

## Hyd. No. 5

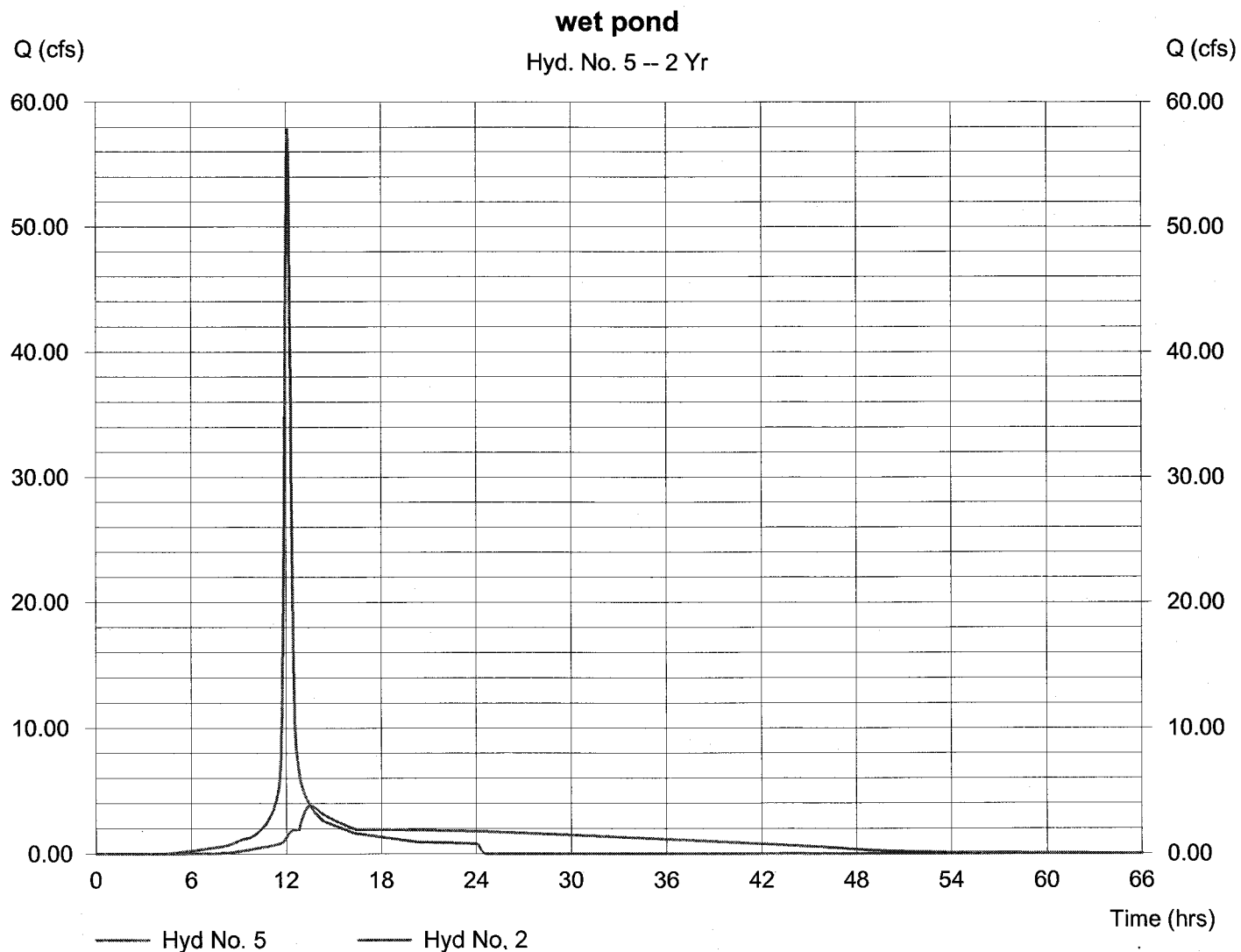
wet pond

Hydrograph type = Reservoir  
Storm frequency = 2 yrs  
Inflow hyd. No. = 2  
Reservoir name = WET POND

Peak discharge = 3.81 cfs  
Time interval = 2 min  
Max. Elevation = 82.02 ft  
Max. Storage = 189,404 cuft

Storage Indication method used. Wet pond routing start elevation = 77.40 ft.

Hydrograph Volume = 202,670 cuft



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	31.96	2	736	145,833	---	---	---	PRE-DEVELOPMENT
2	SCS Runoff	103.74	2	726	377,016	---	---	---	9069POST-DEVELOPMENT
5	Reservoir	62.45	2	738	375,631	2	83.12 no change	228,727	wet pond
bmp#1 revised 4_23_05.GPW					Return Period: 10 Year			Wednesday, May 18 2005, 9:08 AM	

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:32 AM

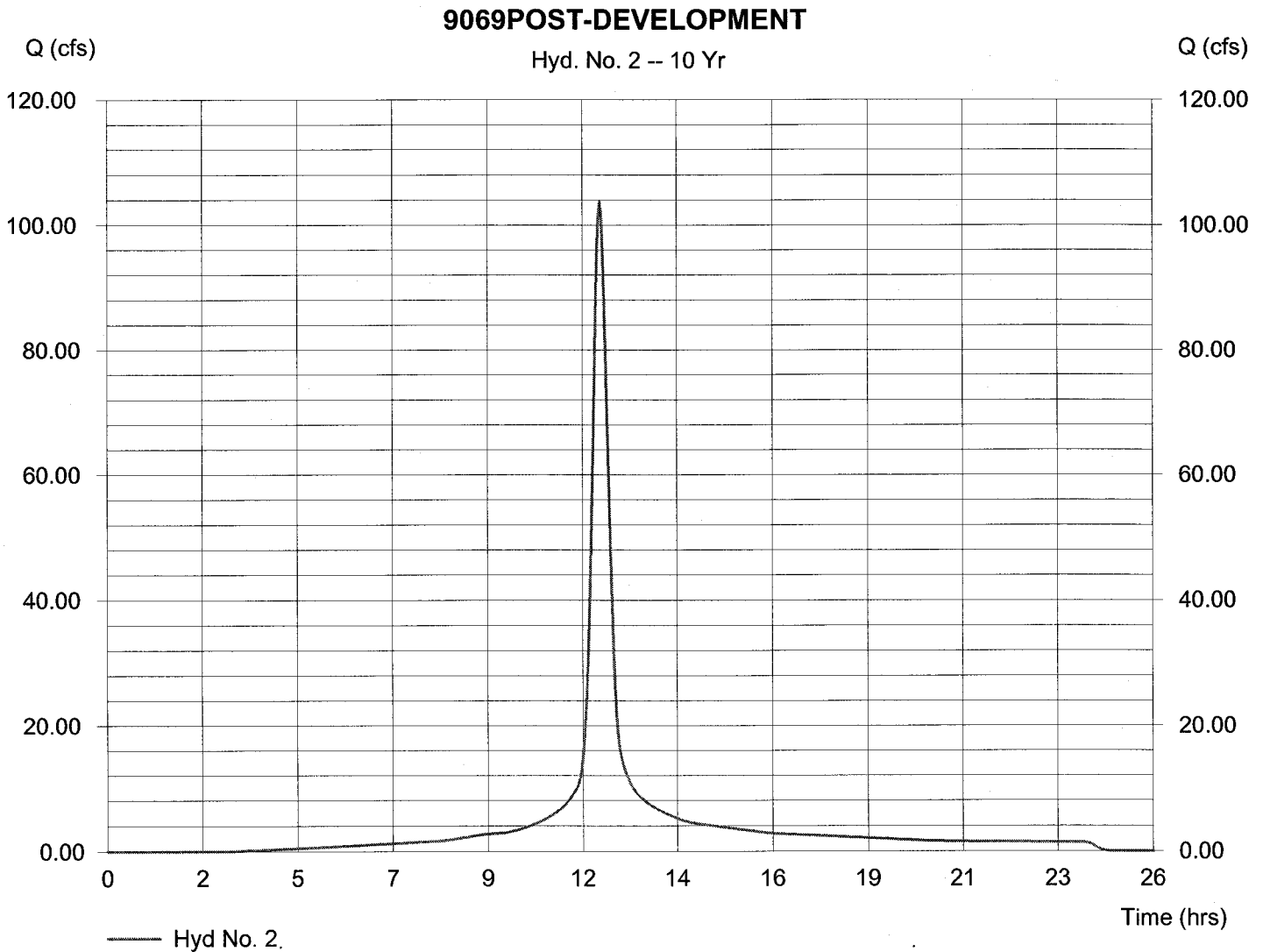
## Hyd. No. 2

### 9069POST-DEVELOPMENT

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 20.94 ac  
Basin Slope = 2.0 %  
Tc method = USER  
Total precip. = 5.80 in  
Storm duration = 24 hrs

Peak discharge = 103.74 cfs  
Time interval = 2 min  
Curve number = 92  
Hydraulic length = 3000 ft  
Time of conc. (Tc) = 21 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 377,016 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:28 AM

## Hyd. No. 5

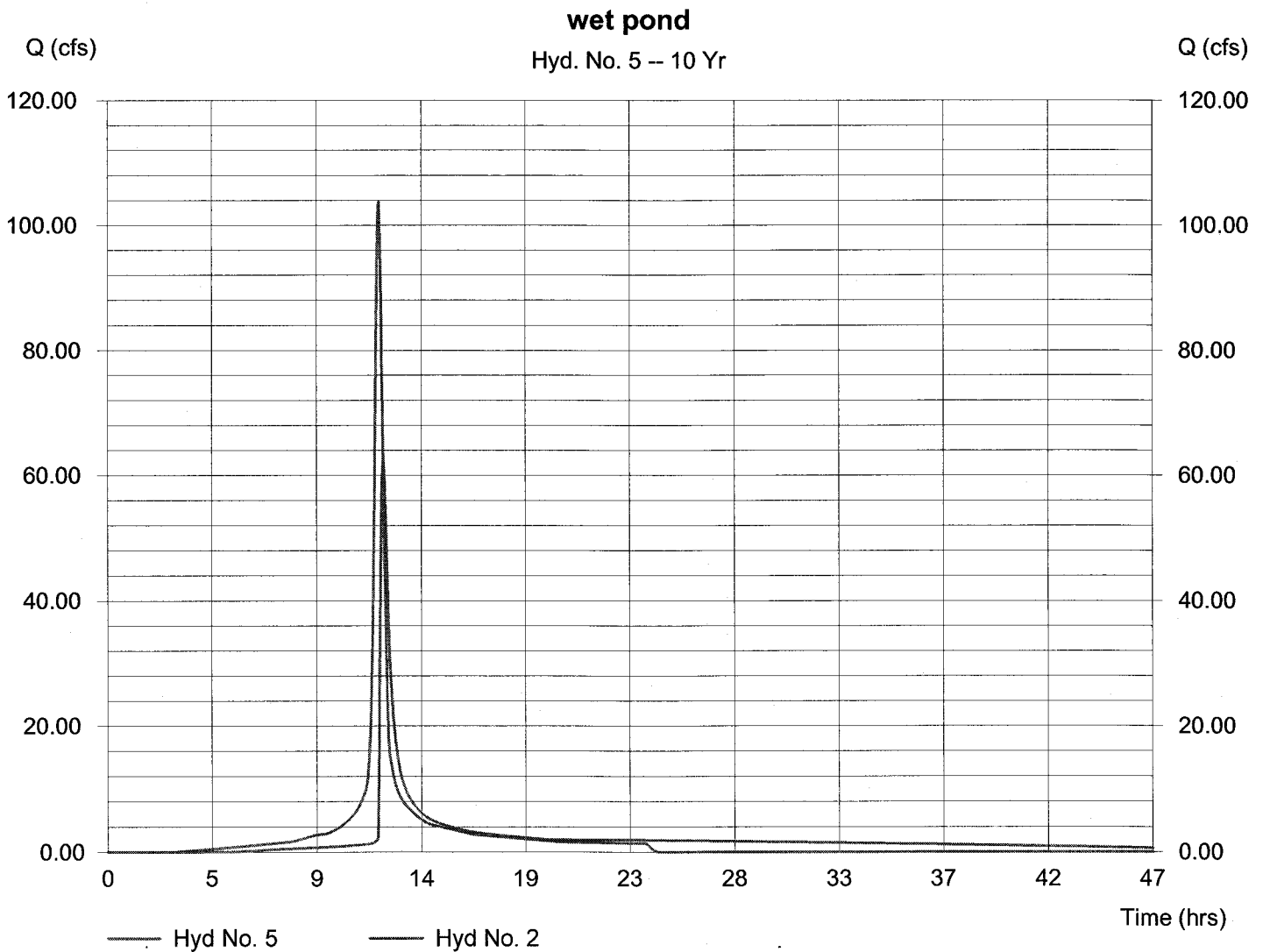
wet pond

Hydrograph type = Reservoir  
Storm frequency = 10 yrs  
Inflow hyd. No. = 2  
Reservoir name = WET POND

Peak discharge = 62.45 cfs  
Time interval = 2 min  
Max. Elevation = 83.12 ft  
Max. Storage = 228,727 cuft

Storage Indication method used. Wet pond routing start elevation = 77.40 ft.

Hydrograph Volume = 375,631 cuft



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	37.56	2	734	170,769	---	----	-----	PRE-DEVELOPMENT
2	SCS Runoff	115.60	2	726	422,677	---	----	-----	9069POST-DEVELOPMENT
5	Reservoir	80.42	2	736	421,283	2	83.31 PREVIOUSLY 83.30	235,601	wet pond
bmp#1 revised 4_23_05.GPW					Return Period: 25 Year			Wednesday, May 18 2005, 9:08 AM	

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:32 AM

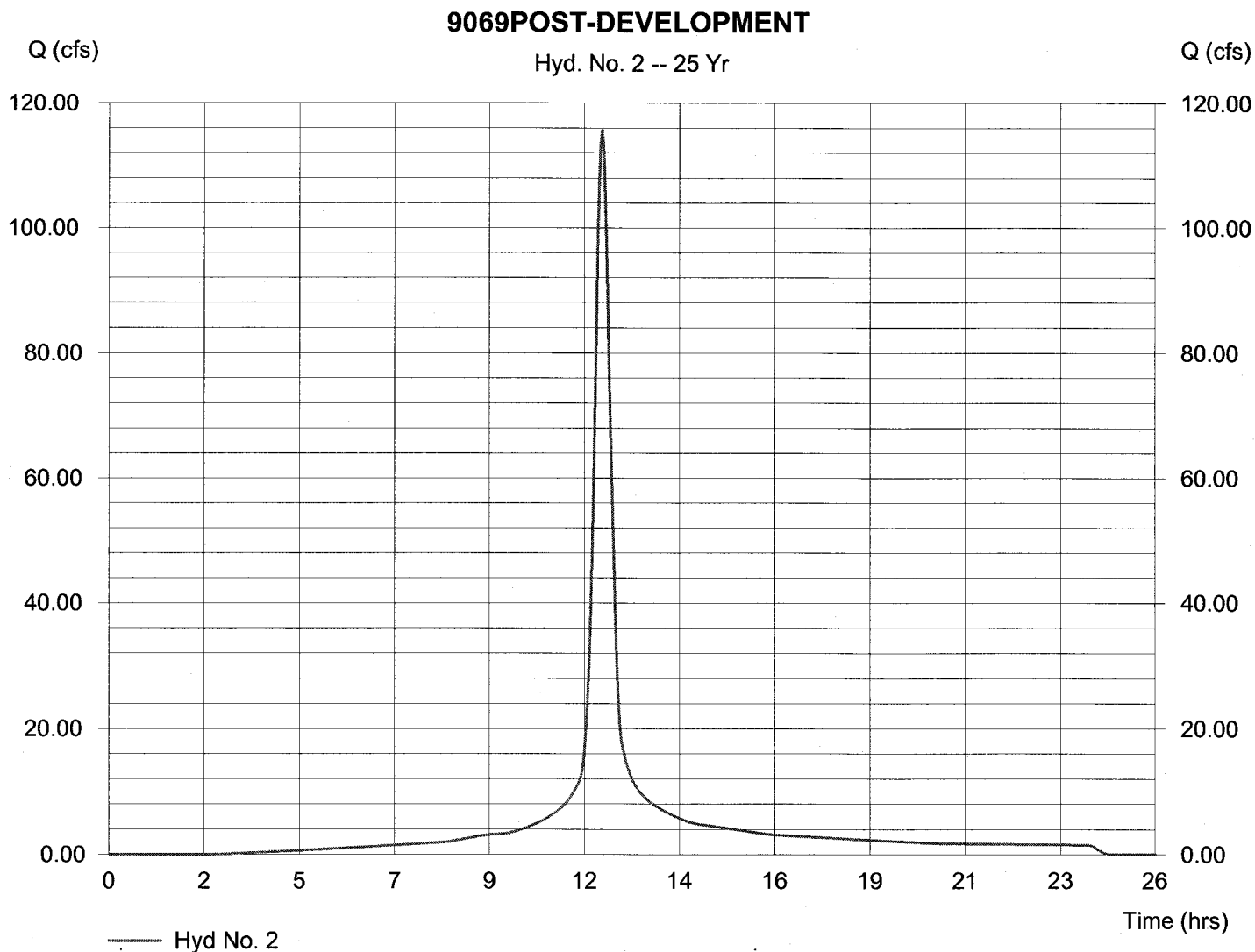
## Hyd. No. 2

### 9069POST-DEVELOPMENT

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 20.94 ac  
Basin Slope = 2.0 %  
Tc method = USER  
Total precip. = 6.40 in  
Storm duration = 24 hrs

Peak discharge = 115.60 cfs  
Time interval = 2 min  
Curve number = 92  
Hydraulic length = 3000 ft  
Time of conc. (Tc) = 21 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 422,677 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:28 AM

## Hyd. No. 5

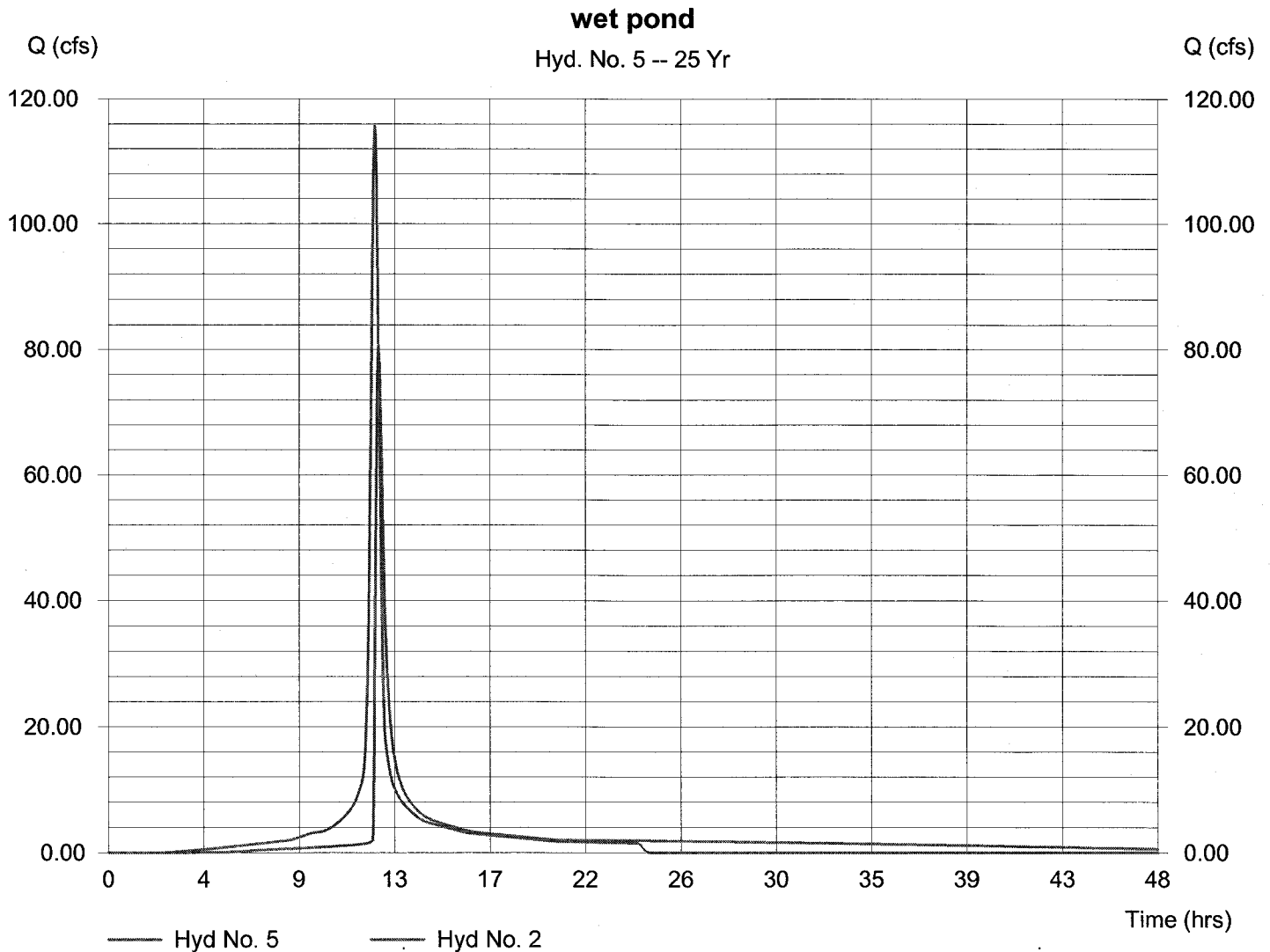
wet pond

Hydrograph type = Reservoir  
Storm frequency = 25 yrs  
Inflow hyd. No. = 2  
Reservoir name = WET POND

Peak discharge = 80.42 cfs  
Time interval = 2 min  
Max. Elevation = 83.31 ft  
Max. Storage = 235,601 cuft

Storage Indication method used. Wet pond routing start elevation = 77.40 ft.

Hydrograph Volume = 421,283 cuft





# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	52.98	2	734	239,937	---	-----	-----	PRE-DEVELOPMENT
2	SCS Runoff	147.05	2	726	544,951	---	-----	-----	9069POST-DEVELOPMENT
5	Reservoir	121.09	2	732	543,542	2	83.70	250,592	wet pond
bmp#1 revised 4_23_05.GPW					Return Period: 100 Year			Wednesday, May 18 2005, 9:08 AM	

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:32 AM

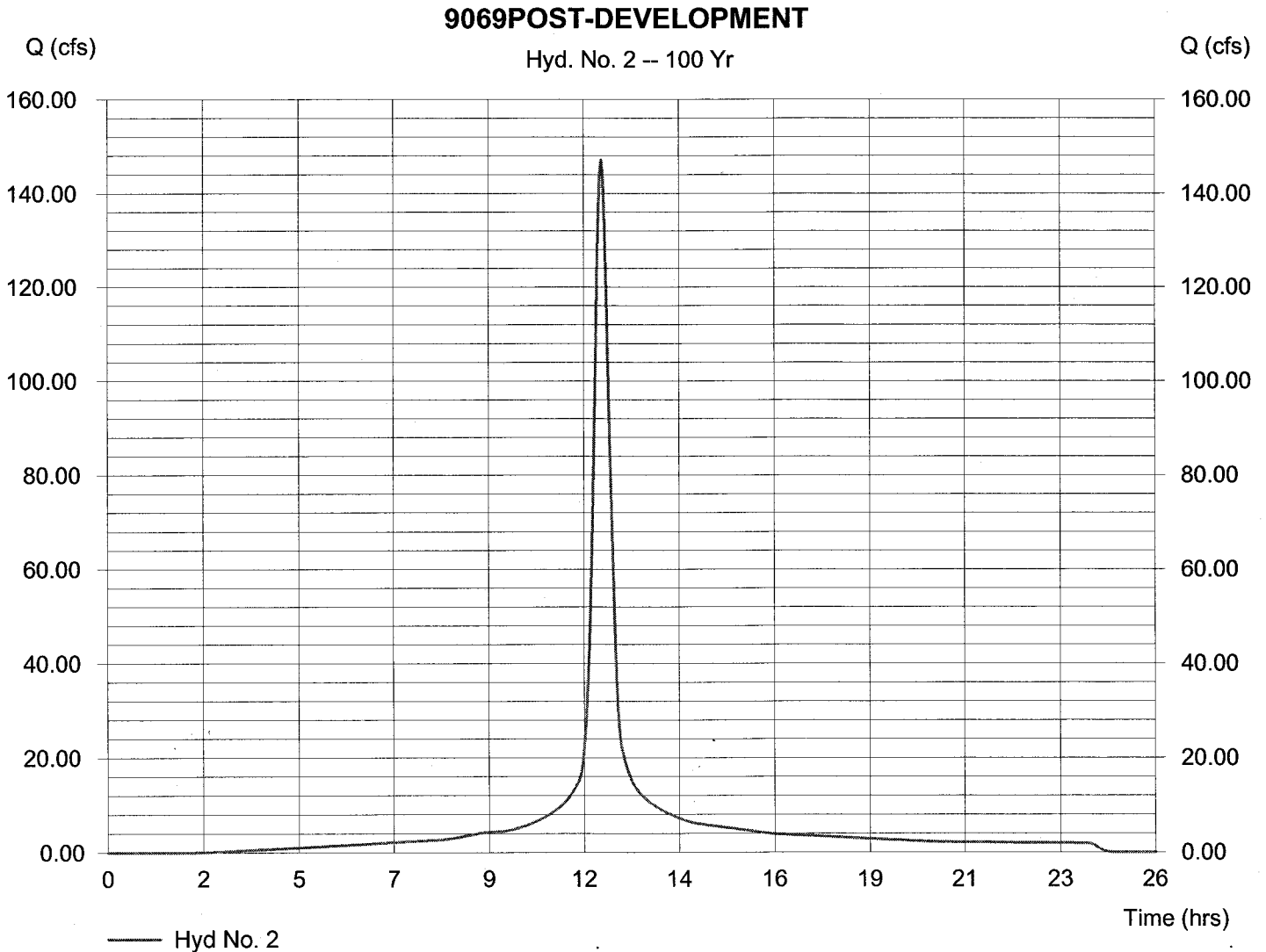
## Hyd. No. 2

### 9069POST-DEVELOPMENT

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 20.94 ac  
Basin Slope = 2.0 %  
Tc method = USER  
Total precip. = 8.00 in  
Storm duration = 24 hrs

Peak discharge = 147.05 cfs  
Time interval = 2 min  
Curve number = 92  
Hydraulic length = 3000 ft  
Time of conc. (Tc) = 21 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 544,951 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:28 AM

## Hyd. No. 5

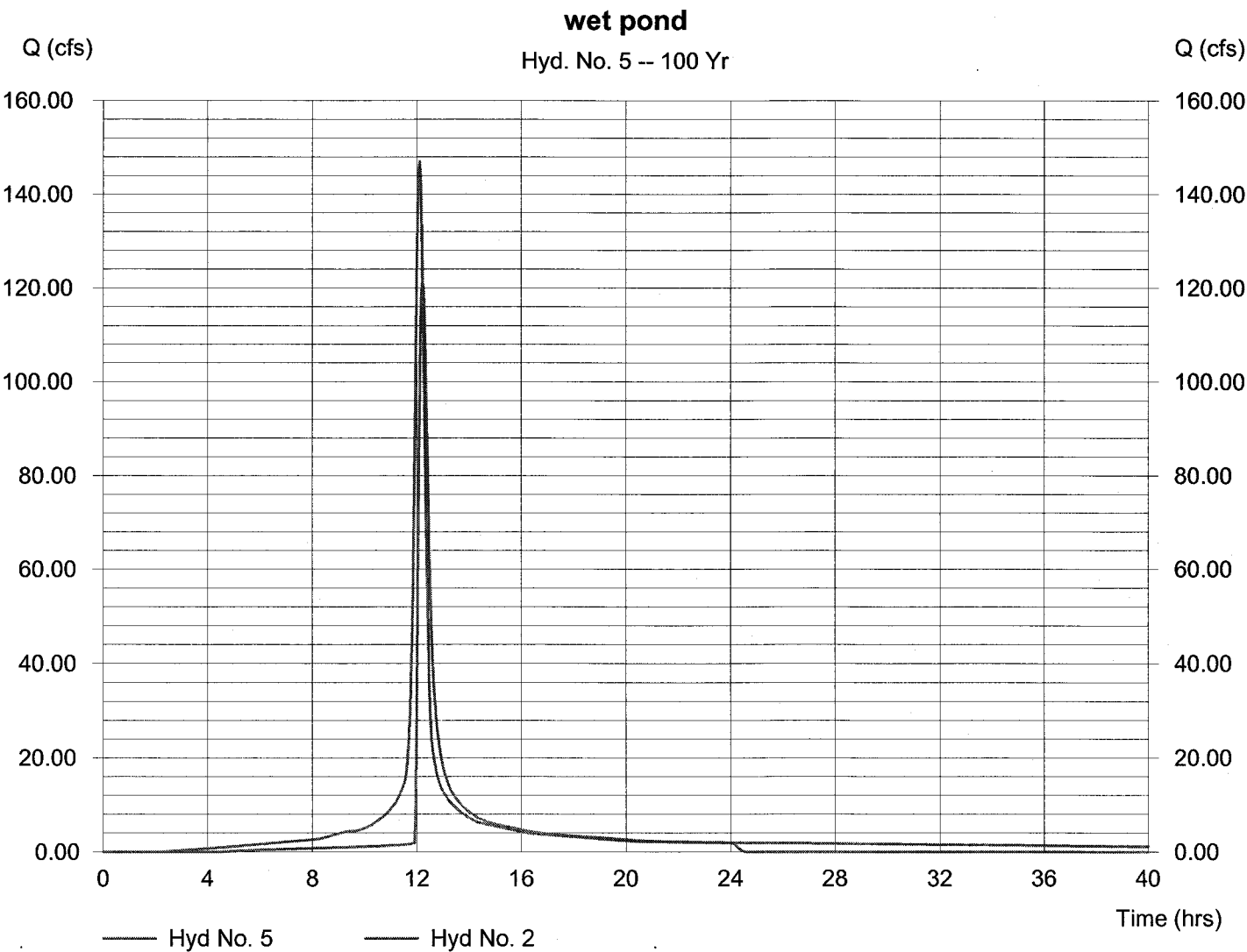
wet pond

Hydrograph type = Reservoir  
Storm frequency = 100 yrs  
Inflow hyd. No. = 2  
Reservoir name = WET POND

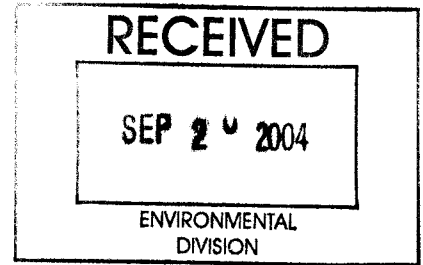
Peak discharge = 121.09 cfs  
Time interval = 2 min  
Max. Elevation = 83.70 ft  
Max. Storage = 250,592 cuft

Storage Indication method used. Wet pond routing start elevation = 77.40 ft.

Hydrograph Volume = 543,542 cuft



## TRANSMITTAL



DATE: September 16, 2004

TO: Environmental  
JCSA (2)

FROM: Christopher Johnson, Senior Planner

SUBJECT: SP-150-03. WindsorMeade Marketplace

ITEMS ATTACHED: Revised Site Plans  
Engineering Calculations & Computations

INSTRUCTIONS: Please review and comment.

RETURN BY: October 1, 2004

AGENCY COMMENTS:

RECEIVED SEP 20 2004  
DUE OCT 11

Approved 10/4/04 DEC

Is this development served by Newport News Waterworks? \_\_\_\_ (JCSA please check if yes)

If checked, planner will fax a copy of preliminary approval letter with Fire Department comments, and the JCSA completed water data sheet to Newport News Waterworks as soon as all three are available.

**TRANSMITTAL**



DATE: July 21, 2004

TO: Environmental  
JCSA (2)  
VDOT

FROM: Christopher Johnson, Senior Planner

SUBJECT: SP-150-03. WindsorMeade Marketplace

ITEMS ATTACHED: Revised Site Plans  
Water Distribution System Analysis (JCSA)  
Water & Sanitary Sewer Data Sheets (JCSA)

INSTRUCTIONS: Please review and comment.

RETURN BY: August 4, 2004

AGENCY COMMENTS:

RECEIVED JUL 26 2004  
Due AUG 11

*Approved. Specific recommendations for BMP construction as outlined in the geotechnical report by ECS Ltd. (7/20/04; 07:6958) need to be considered during construction of the wet pond BMP.*

*Ant J Thuman for DEC*  
*8-24-04*

Is this development served by Newport News Waterworks? \_\_\_\_ (JCSA please check if yes)

If checked, planner will fax a copy of preliminary approval letter with Fire Department comments, and the JCSA completed water data sheet to Newport News Waterworks as soon as all three are available.



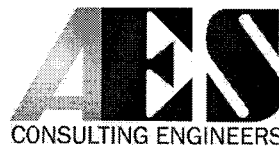
Windsormeade Marketplace  
James City County Environmental

September 13, 2004

2 COPIES OF COMPUTATIONS

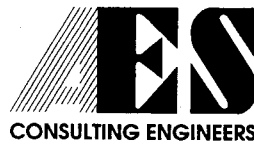
SP-150-03  
FINAL SUBMISSION

Prepared by:



**AES Consulting Engineers**  
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September 13, 2004

Mr. Christopher Johnson  
Senior Planner  
James City County  
101-E Mounts Bay Road  
Williamsburg, Virginia 23187-8784

**RE: Case No. SP-150-03. Windsor Meade Marketplace  
AES Job No. 9069-02**

Dear Mr. Johnson:

This letter is a response to the requested changes or revisions to the above referenced site plans. Changes or revisions were made to these documents to address the items provided in your letter of August 9, 2004. We are very hopeful this re-submittal will satisfy your comments and lead to a final approval.

Planning:

1. Revised landscaping plans have not been submitted for review. Staff is aware that the landscape plans are being prepared by Higgins & Gerstenmaier.

**It is our understanding that the landscape drawings have been submitted under separate cover by Higgins and Gerstenmaier.**

JCSA:

James City Service Authority has reviewed these plans for general compliance with the JCSA Standards and Specifications, Water Distribution and Sanitary Sewer Systems and have the following comments. Quality control and back checking of the plans and calculations for discrepancies, errors, omissions, and conflicts is the sole responsibility of the professional engineer and/or surveyor who has signed, sealed, and dated the plans and calculations. It is the responsibility of the engineer or surveyor to ensure the plans and calculations comply with all governing regulations, standards, and specifications. Before the JCSA can approve these plans for general compliance with the JCSA Standards and Specifications, the following comments must be addressed. We may have additional

comments when a revised plan incorporating these comments is submitted.

*General Comments:*

1. The Applicant shall provide landscape drawings which address JCSA comments previously issued on May 6, 2004.

**It is our understanding that the landscape drawings have been submitted under separate cover by Higgins and Gerstenmaier.**

2. Per previous comment and prior to JCSA acceptance of the utilities, the Owner/Developer shall provide a formal instrument which emulates the Urban Easement requirement established for other phases of the New Town development.

**This has been provided to JCSA (Larry Foster) by the developer on July 9, 2004. A copy of this submitted agreement is included in your package.**

3. Calculations substantiating proposed meter sizes were not provided with the site plan submittal. As previously requested, the Applicant shall provide water demand calculations for verification that the proposed water meters are adequately sized. Calculations shall be provided for each "unit" of buildings and be based on the International Plumbing Code. If data is not available at this time in relation to the type of tenant and fixtures required, then the Applicant shall show and label the meter locations as future (w/o size annotated). A stub/valve can be provided at the location for future installation.

**This information is now provided with this submittal package.**

*Sheet 6:*

1. The Applicant shall either indicate the check valve type required at the fire service connection or remove the note referencing JCSA. This is part of the proposed private fire supply line and the responsibility of the Owner/Developer. JCSA's responsibility terminates with the detector check valve assembly proposed prior to the fire supply pump. Revise call-out accordingly.

**Per our conversation of August 19, 2004, the note referring JCSA at the fire service connection has been removed.**



*Sheet 13:*

1. WL "A" Profile:
  - A. Sta 16+10 (+/-): The graphical location of the 10" HDPE pipe contradicts design data provided on Sheet 9. It appears that the proposed storm sewer will actually conflict with the proposed 12" waterline. Verify and revise accordingly. A minimum vertical clearance of 18-inches shall be provided between the waterline and the storm sewer crossing.

**The HDPE pipe inverts have been modified. There is no conflict with the proposed 12" waterline. A minimum cover of 18" was maintained at the crossing of the HDPE pipe and the waterline.**

2. Ex San MH #7 to San MH #3:
  - A. Sta 16+10 (+/-): The graphical location of the 10" HDPE pipe contradicts design data provided on Sheet 9. A minimum vertical clearance of 18-inches shall be provided between the sanitary sewer and the storm sewer crossing.

**The HDPE pipe inverts have been modified. A minimum cover of 18" was maintained at the crossing of the HDPE pipe and the gravity sewer line.**

*Sheet 15:*

1. WL "B" & "C" Profiles: Pipe material from the tee to the hydrant shall be DIP. Revise plan and profile accordingly.

**Waterlines "B" and "C" servicing the fire hydrants have now been modified to be ductile iron pipe. The water data sheets have also been modified to reflect this revision.**

*Water Data Sheet:*

1. Section 5b: The Applicant shall revise the line item to provide the "Average Day Domestic Demand" in gpm for the development (refer to JCSA standards Section 2.9A). Reference to any fire flows or pressures should not be included as part of this line item. Verify and revise accordingly.

**The average day domestic demand in section 5b represents the total from the water meter sizing calculations divided by 4 and multiplied by 1.7. This should give you the "Average Day Domestic Demand."**

2. Section 6:

1. Verify where the 8-inch PVC pipeline is used on this project. If not, remove from tabulation block.

**This 8" PVC is no longer used for the waterline. This has been removed from the tabulation block.**

2. Revise callout for "6" fire line to DDC vault" to read "8" fire line to Detector Check Valve".

**This callout now reads "8" fire line to Detector Check Valve" to coincide with the plan.**

3. Per previous comment, fire hydrant pipe material shall be DIP.

**The service lines "B" and "C" are now all ductile iron.**

3. Section 7: Refer to General Comments Note 3 above concerning meter sizing. The Water Data Sheet references four 1-inch meters when five are shown on the plan. Verify and revise accordingly.

**The water data sheet has been revised to accurately reflect the water meters depicted on the plans.**

*Sanitary Sewer Data Sheet:*

1. Section 6: The 8" PVC pipe length listed does not correspond with profiled information on the plan (appears to be 1116 lf). Verify and revise accordingly.

**The 866 lf of 8" PVC listed in section 6 is correct. Per previous comment, we had removed the 250 lf of PVC pipe designated as "private" from the sanitary sewer data sheet.**

*Water Distribution Hydraulic Analysis:*

1. Provide a professional engineer's seal, signed and dated, on the cover of the hydraulic analysis report.

**The hydraulic analysis has been sealed and signed.**

2. Nodal Demand Summary Table:
  - A. Fire Flow + Max Day + Irrigation column - Flows listed for nodes J-2, J-4M and J-8M appear to be incorrect as they do not include the proposed irrigation flows. Verify and revise accordingly.

**The hydraulic analysis nodal summary table has been updated.**

3. It appears the flows associated with Node J-4M was omitted from each scenario analysis. Verify and revise accordingly.

**The hydraulic analysis has been updated so that node J-4M has the correct flows associated with the node.**

Environmental:

Base upon resubmitted plans and computations, all comments relating to the site erosion and sediment control plan and major issues associated with the site stormwater management plan have been adequately addressed; therefore, the plan is approved for land-disturbing permit purposes. The following two comments, which pertain to final site plan approval for the project, are still outstanding. Final site plan approval for the project cannot be granted by our Division until the following two issues are resolved.

1. Geotechnical. Previous comment #11 was not addressed. Response indicates that a geotechnical report is forthcoming to show that existing soils beneath the wet pond are adequate to sustain a permanent pool as intended for a County type A-3 BMP. Final site plan approval cannot be issued by our Division until it is determined the BMP will function as a wet pond per the BMP point calculation (County type A-3 BMP).

✓ **The geotechnical report has been submitted. Per your discussion with Arch Marston it was determined that no liner would be required for this BMP.**

2. Landscaping. Previous comment #12 was not addressed. Response indicates that the landscaping comment will be addressed on forthcoming landscape plans. The landscaping plan must show pond perimeter and bench landscaping and plantings, consistent with the requirements of the County BMP manual and Minimum Standard & Spec. 3.05 of the Virginia Stormwater Management Handbook and to remain consistent with the approved pond bench waiver request.

✓ **It is our understanding that the landscape drawings have been submitted under separate cover by Higgins and Gerstenmaier.**

3. Per telephone message you requested a modification to the emergency spillway and design calculations in relationship to the 100 yr storm event.

**The emergency spillway has been modified per your request and the design information has been provided per your request.**

**Please note we have made minor changes to storm sewer system #1 and storm sewer system #3 for ease of construction. New computations have been provided for the changes. The revisions to these systems are listed below:**

**Sheet 8**

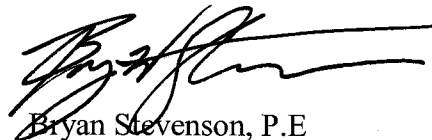
- **SS#1-13 was changed from a manhole to a drop inlet. This reduces the drainage area serviced by SS#1-17 from 2.15 Ac. to 1.94 Ac.**
- **SS#1-13 now outfalls to structure SS#1-11 (it previously outfalled to SS#1-5 which made the constructability of that inlet difficult.) The inverts have been adjusted between SS#1-11 and SS#1-16A.**
- **Inlet SS#1-16A was added. The drainage area previously served by SS#1-16 is now split between SS#1-16 and SS#1-16A.**

**Sheet 9**

- **SS#3-2 was deepened to avoid conflicts with the utilities.**

I would like to thank you and the other agencies involved for their assistance in the review of this project. Should any further questions arise, please feel free to contact us.

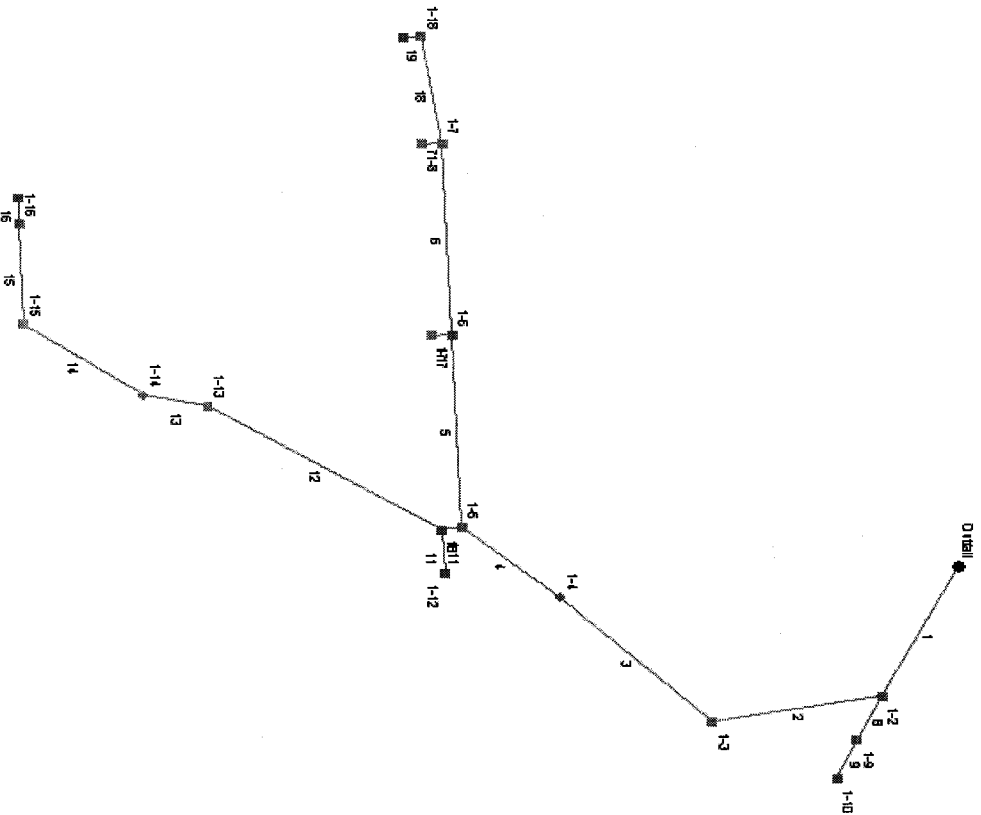
Sincerely,  
AES Consulting Engineers



Bryan Stevenson, P.E.  
Project Manager

# STORM SEWER SYSTEM #1 Hydraflow Plan View

8/19/04



Project file: stormsystem#1.stm

No. Lines: 19

08-18-2004

# Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	192.0	1.11	16.49	0.90	1.00	14.72	5.0	21.5	4.3	63.92	106.2	5.09	48	0.55	77.15	76.10	83.50	83.12	86.50	0.00	1-1 to 1-2
2	1	203.0	0.66	13.13	0.90	0.59	11.69	12.0	20.7	4.4	51.75	104.8	4.12	48	0.53	78.23	77.15	84.27	84.00	89.30	86.50	1-2 to 1-3
3	2	243.0	0.00	12.47	0.90	0.00	11.10	0.0	19.7	4.5	50.29	101.8	4.00	48	0.50	79.45	78.23	84.85	84.56	91.00	89.30	1-3 to 1-4
4	3	149.0	1.63	12.47	0.90	1.47	11.10	17.0	19.1	4.6	51.03	101.9	4.06	48	0.50	80.20	79.45	85.08	84.89	88.29	91.00	1-4 to 1-5
5	4	252.0	1.25	6.43	0.90	1.13	5.66	5.0	7.8	6.3	35.82	47.16	5.07	36	0.50	81.46	80.20	86.09	85.36	87.80	88.29	1-5 to 1-6
6	5	252.0	1.14	3.22	0.90	1.03	2.77	5.0	6.2	6.7	18.55	47.16	2.63	36	0.50	82.72	81.46	86.88	86.69	87.80	87.80	1-6 to 1-7
7	6	24.0	1.46	1.46	0.90	1.31	1.31	5.0	5.0	7.0	9.19	38.63	2.93	24	2.92	83.42	82.72	87.08	87.04	88.10	87.80	1-7 to 1-8
8	1	64.0	1.80	2.25	0.90	1.62	2.03	10.0	10.0	5.9	11.93	38.45	3.80	24	2.89	79.00	77.15	84.18	84.00	85.50	86.50	1-9 to 1-2
9	8	56.0	0.45	0.45	0.90	0.41	0.41	8.0	8.0	6.3	2.55	8.63	2.08	15	1.79	80.00	79.00	84.38	84.29	86.33	85.50	1-10 to 1-9
10	4	24.0	1.25	4.41	0.90	1.13	3.97	19.0	19.0	4.6	18.28	40.51	5.82	24	3.21	80.97	80.20	85.52	85.36	88.29	88.29	1-11 to 1-5
11	10	58.0	0.61	0.61	0.90	0.55	0.55	18.0	18.0	4.7	2.59	13.22	2.11	15	4.19	83.40	80.97	86.40	86.31	89.70	88.29	1-12 to 1-11
12	10	321.0	0.19	2.55	0.90	0.17	2.30	5.0	7.2	6.5	14.85	15.77	4.73	24	0.49	82.53	80.97	87.69	86.31	91.53	88.29	1-13 to 1-11
13	12	77.0	0.00	2.36	0.90	0.00	2.12	0.0	6.9	6.5	13.88	15.89	4.42	24	0.49	82.91	82.53	88.23	87.94	93.50	91.53	1-14 to 1-13
14	13	170.0	1.05	2.36	0.90	0.94	2.12	5.0	6.2	6.7	14.19	15.71	4.52	24	0.48	83.73	82.91	89.03	88.36	90.75	93.50	1-15 to 1-14
15	14	132.0	0.59	1.31	0.90	0.53	1.18	5.0	5.4	6.9	8.13	15.63	2.59	24	0.48	84.36	83.73	89.60	89.43	89.90	90.75	1-16 to 1-15
16	15	34.0	0.72	0.72	0.90	0.65	0.65	5.0	5.0	7.0	4.53	14.51	1.44	24	0.41	84.50	84.36	89.67	89.65	89.90	89.90	1-16A to 1-16
17	5	24.0	1.96	1.96	0.90	1.76	1.76	5.0	5.0	7.0	12.34	39.18	3.93	24	3.00	82.18	81.46	86.76	86.69	87.80	87.80	1-17 to 1-6
18	6	142.0	0.26	0.62	0.70	0.18	0.43	5.0	5.3	6.9	3.01	8.18	2.45	15	1.61	85.00	82.72	87.35	87.04	89.00	87.80	1-18 to 1-7
19	18	22.0	0.36	0.36	0.70	0.25	0.25	5.0	5.0	7.0	1.76	7.54	1.44	15	1.36	85.30	85.00	87.51	87.49	89.00	89.00	1-19 to 1-18

NEW DRAINAGE AREAS

NEW DRAINAGE AREAS

OUTPAUS  
TO NEW  
STATION

Project File: stormsystem#1.stm

Number of lines: 19

Run Date: 08-18-2004

NOTES: Intensity = 140.36 / (Inlet time + 19.80) ^ 0.93; Return period = 10 Yrs.

# STORM SEWER SYSTEM #3 Hydraflow Plan View

8/19/04



Project file: stormsystem#3.stm	No. Lines: 1	08-16-2004
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# Storm Sewer Tabulation

Station	Line To Line	Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
			Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	50.0	1.13	1.13	0.90	1.02	1.02	5.0	5.0	7.0	7.11	12.11	5.80	15	2.52	78.96	77.70	83.55	83.12	90.55	78.95	
<div> <div>↑</div> <div>LOWERS TO AVOID DRAINAGE CONFLICT WITH UTILITIES</div> </div>																						

Project File: stormsystem#3.stm

Number of lines: 1

Run Date: 08-16-2004

NOTES: Intensity = 140.36 / (Inlet time + 19.80) ^ 0.93; Return period = 10 Yrs.



# STORM SEWER SYSTEM #1

8/19/04



CONSULTING ENGINEERS

5248 Old Towne Road, Suite 1  
Williamsburg, Virginia 23188  
(757) 253-0040  
Fax: (757) 220-8994

PROJECT NO.  
SUBJECT  
SHEET NO.  
DATE  
BY

WINDSORMEADE MARKETPLACE  
9069  
Spread Calc's  
1  
####  
BWS

## STORM WATER INLET COMPUTATIONS

INLET			Station	Drainage Area (Ac)	C	CA	Σ CA	I in/hr	Q-Inter (CFS)	Q Carry- Over (CFS)	Qt Gutter Flow	S Gutter Slope (ft/ft)	Sx Cross Slope (ft/ft)	T(Spread)	W (ft)	W/T	Sw (ft/ft)	Sw/Sx	Eo(#10)	n	Local Dep.	a	S'w =a/(12W)	Se (ft/ft) =Sx+SwEo	Lt (ft) 15 P Effec L	L/Lt d (ft)	E(#16) h (ft)	Q Int CFS d/h	Q Carryover Spread	Remark
Number	Type	Length																												
SSI-15	DI-2B	8		0.66	0.9	0.59	0.59	6.4	3.8		3.8	0	0.02	12	Flow Approaching From 21	0.081									11.6	0.37	0.46	0.81	18.6	
				0.39	0.9	0.35	0.35	6.4	2.25		2.25	0	0.02	12	Flow Approaching From															
SSI-16	DI-2B	6		0.27	0.9	0.24	0.24	6.4	1.56		1.56	0	0.02	11.3	Flow Approaching From 21	0.081									9.6	0.29	0.46	0.62	14.4	
				0.32	0.9	0.29	0.29	6.4	1.84		1.84	0	0.02	12	Flow Approaching From															
SSI-16A	DI-2B	6		0.24	0.9	0.22	0.22	6.4	1.38		1.38	0	0.02	10.7	Flow Approaching From 21	0.081									9.6	0.33	0.46	0.71	16.4	
				0.48	0.9	0.43	0.43	6.4	2.76		2.76	0	0.02	12	Flow Approaching From															
SSI-8	DI-2C	20		0.71	0.9	0.64	0.64	6.4	4.09		4.09	0	0.02	12	Flow Approaching From 21	0.081									23.6	0.29	0.46	0.62	14.4	
				0.74	0.9	0.67	0.67	6.4	4.26		4.26	0	0.02	12	Flow Approaching From															
SSI-7	DI-2C	20		0.51	0.9	0.46	0.46	6.4	2.94	0	2.94	0	0.02	12	Flow Approaching From 21	0.081									23.6	0.24	0.46	0.53	12.2	
				0.63	0.9	0.57	0.57	6.4	3.63	0	3.63	0	0.02	12	Flow Approaching From															

NEW INLETS



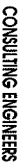
**Fax: (757) 220-8994**

BY

BWS

DRAINAGE AREA REVISIT

[illegible]



**Fax: (757) 220-8991**

BY

BWS

# SIUKM WAIER INLEI COMPUAIONS

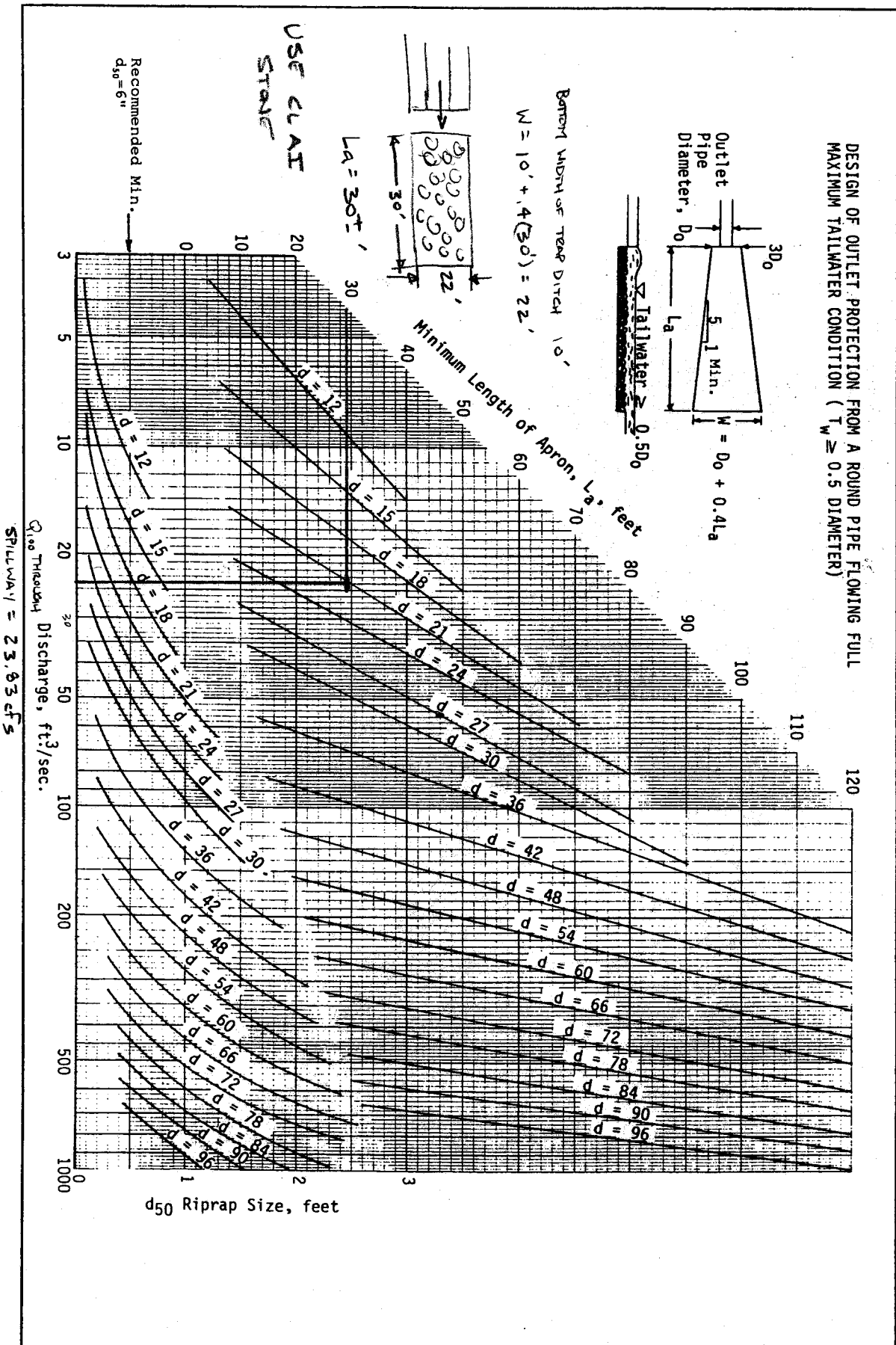
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OUTFALL STONE FOR EMERGENCY SPILLWAY  $Q_{1.00} = 23.83 \text{ cfs}$

Source: USDA-SCS

III - 165

Plate 3.18-4



1992

3.18

# Pond Report

Hydraflow Hydrographs by Intelisolve

Tuesday, Aug 17 2004, 4:15 PM

**Pond No. 2 - WET POND**

## Pond Data

Pond storage is based on known contour areas. Average end area method used.

## Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	73.00	6,701	0	0
1.00	74.00	12,612	9,657	9,657
2.00	75.00	13,689	13,151	22,807
3.00	76.00	14,799	14,244	37,051
4.00	77.00	15,942	15,371	52,422
5.00	78.00	22,057	19,000	71,421
6.00	79.00	27,489	24,773	96,194
7.00	80.00	29,673	28,581	124,775
8.00	81.00	31,917	30,795	155,570
9.00	82.00	34,224	33,071	188,641
10.00	83.00	36,580	35,402	224,043
11.00	84.00	38,898	37,739	261,782
11.80	84.80	40,842	31,896	293,678

## Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 36.00	6.00	0.00	0.00
Span (in)	= 36.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 72.72	77.45	0.00	0.00
Length (ft)	= 61.00	0.00	0.00	0.00
Slope (%)	= 1.18	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	Yes	No	No

## Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.56	10.00	0.00	0.00
Crest El. (ft)	= 81.90	82.90	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Riser	Ciplti	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.

## Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	73.00	0.00	0.00	---	---	0.00	0.00	---	---	---	0.00
0.10	966	73.10	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
0.20	1,931	73.20	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
0.30	2,897	73.30	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
0.40	3,863	73.40	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
0.50	4,828	73.50	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
0.60	5,794	73.60	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
0.70	6,760	73.70	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
0.80	7,725	73.80	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
0.90	8,691	73.90	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.00	9,657	74.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.10	10,972	74.10	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.20	12,287	74.20	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.30	13,602	74.30	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.40	14,917	74.40	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.50	16,232	74.50	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.60	17,547	74.60	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.70	18,862	74.70	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.80	20,177	74.80	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.90	21,492	74.90	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.00	22,807	75.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.10	24,231	75.10	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.20	25,656	75.20	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.30	27,080	75.30	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.40	28,505	75.40	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00

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## WET POND

## Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
2.50	29,929	75.50	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.60	31,353	75.60	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.70	32,778	75.70	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.80	34,202	75.80	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.90	35,627	75.90	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.00	37,051	76.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.10	38,588	76.10	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.20	40,125	76.20	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.30	41,662	76.30	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.40	43,199	76.40	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.50	44,736	76.50	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.60	46,273	76.60	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.70	47,810	76.70	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.80	49,347	76.80	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.90	50,884	76.90	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
4.00	52,422	77.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
4.10	54,321	77.10	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
4.20	56,221	77.20	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
4.30	58,121	77.30	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
4.40	60,021	77.40	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
4.50	61,921	77.50	0.62	0.01	---	---	0.00	0.00	---	---	---	0.01
4.60	63,821	77.60	0.62	0.07	---	---	0.00	0.00	---	---	---	0.07
4.70	65,721	77.70	0.62	0.17	---	---	0.00	0.00	---	---	---	0.17
4.80	67,621	77.80	0.62	0.30	---	---	0.00	0.00	---	---	---	0.30
4.90	69,521	77.90	0.62	0.43	---	---	0.00	0.00	---	---	---	0.43
5.00	71,421	78.00	0.62	0.52	---	---	0.00	0.00	---	---	---	0.52
5.10	73,898	78.10	0.62	0.60	---	---	0.00	0.00	---	---	---	0.60
5.20	76,376	78.20	0.67	0.67	---	---	0.00	0.00	---	---	---	0.67
5.30	78,853	78.30	0.74	0.73	---	---	0.00	0.00	---	---	---	0.73
5.40	81,330	78.40	0.81	0.79	---	---	0.00	0.00	---	---	---	0.79
5.50	83,807	78.50	0.88	0.85	---	---	0.00	0.00	---	---	---	0.85
5.60	86,285	78.60	0.90	0.90	---	---	0.00	0.00	---	---	---	0.90
5.70	88,762	78.70	0.96	0.95	---	---	0.00	0.00	---	---	---	0.95
5.80	91,239	78.80	1.04	0.99	---	---	0.00	0.00	---	---	---	0.99
5.90	93,717	78.90	1.04	1.04	---	---	0.00	0.00	---	---	---	1.04
6.00	96,194	79.00	1.13	1.08	---	---	0.00	0.00	---	---	---	1.08
6.10	99,052	79.10	1.13	1.12	---	---	0.00	0.00	---	---	---	1.12
6.20	101,910	79.20	1.22	1.16	---	---	0.00	0.00	---	---	---	1.16
6.30	104,768	79.30	1.22	1.20	---	---	0.00	0.00	---	---	---	1.20
6.40	107,626	79.40	1.23	1.23	---	---	0.00	0.00	---	---	---	1.23
6.50	110,485	79.50	1.32	1.27	---	---	0.00	0.00	---	---	---	1.27
6.60	113,343	79.60	1.32	1.30	---	---	0.00	0.00	---	---	---	1.30
6.70	116,201	79.70	1.34	1.34	---	---	0.00	0.00	---	---	---	1.34
6.80	119,059	79.80	1.42	1.37	---	---	0.00	0.00	---	---	---	1.37
6.90	121,917	79.90	1.42	1.40	---	---	0.00	0.00	---	---	---	1.40
7.00	124,775	80.00	1.43	1.43	---	---	0.00	0.00	---	---	---	1.43
7.10	127,855	80.10	1.53	1.46	---	---	0.00	0.00	---	---	---	1.46
7.20	130,934	80.20	1.53	1.49	---	---	0.00	0.00	---	---	---	1.49
7.30	134,014	80.30	1.53	1.52	---	---	0.00	0.00	---	---	---	1.52
7.40	137,093	80.40	1.55	1.55	---	---	0.00	0.00	---	---	---	1.55
7.50	140,173	80.50	1.64	1.58	---	---	0.00	0.00	---	---	---	1.58
7.60	143,252	80.60	1.64	1.61	---	---	0.00	0.00	---	---	---	1.61
7.70	146,332	80.70	1.64	1.64	---	---	0.00	0.00	---	---	---	1.64
7.80	149,411	80.80	1.66	1.66	---	---	0.00	0.00	---	---	---	1.66
7.90	152,491	80.90	1.76	1.69	---	---	0.00	0.00	---	---	---	1.69
8.00	155,570	81.00	1.76	1.72	---	---	0.00	0.00	---	---	---	1.72
8.10	158,877	81.10	1.76	1.74	---	---	0.00	0.00	---	---	---	1.74
8.20	162,184	81.20	1.77	1.77	---	---	0.00	0.00	---	---	---	1.77
8.30	165,491	81.30	1.79	1.79	---	---	0.00	0.00	---	---	---	1.79
8.40	168,798	81.40	1.89	1.82	---	---	0.00	0.00	---	---	---	1.82
8.50	172,105	81.50	1.89	1.84	---	---	0.00	0.00	---	---	---	1.84
8.60	175,412	81.60	1.89	1.87	---	---	0.00	0.00	---	---	---	1.87
8.70	178,719	81.70	1.89	1.89	---	---	0.00	0.00	---	---	---	1.89
8.80	182,026	81.80	1.91	1.91	---	---	0.00	0.00	---	---	---	1.91
8.90	185,333	81.90	2.02	1.94	---	---	0.00	0.00	---	---	---	1.94
9.00	188,641	82.00	3.30	1.96	---	---	1.32	0.00	---	---	---	3.28
9.10	192,181	82.10	5.74	1.98	---	---	3.74	0.00	---	---	---	5.72
9.20	195,721	82.20	9.01	2.01	---	---	6.87	0.00	---	---	---	8.88
9.30	199,261	82.30	12.63	2.03	---	---	10.58	0.00	---	---	---	12.61
9.40	202,801	82.40	17.14	2.05	---	---	14.79	0.00	---	---	---	16.84

Continues on next page...

## WET POND

**Stage / Storage / Discharge Table**

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
9.50	206,342	82.50	21.51	2.07	---	---	19.44	0.00	---	---	---	21.51
9.60	209,882	82.60	26.71	2.09	---	---	24.49	0.00	---	---	---	26.59
9.70	213,422	82.70	32.09	2.11	---	---	29.93	0.00	---	---	---	32.04
9.80	216,962	82.80	37.84	2.13	---	---	35.71	0.00	---	---	---	37.84
9.90	220,502	82.90	43.98	2.16	---	---	41.82	0.00	---	---	---	43.98
10.00	224,043	83.00	50.43	2.18	---	---	48.25	1.05	---	---	---	51.48
10.10	227,816	83.10	57.18	2.20	---	---	54.98	2.98	---	---	---	60.16
10.20	231,590	83.20	64.19	2.20	---	---	61.99	5.47	---	---	---	69.67
10.30	235,364	83.30	71.33	2.05	---	---	69.28	8.42	---	---	---	79.75
10.40	239,138	83.40	78.69	1.85	---	---	76.84	11.77	---	---	---	90.46
10.50	242,912	83.50	86.25	1.60	---	---	84.65	15.48	---	---	---	101.72
10.60	246,686	83.60	93.96	1.25	---	---	92.70	19.50	---	---	---	113.46
10.70	250,460	83.70	97.04	1.10	---	---	95.94	23.83	---	---	---	120.86
10.80	254,234	83.80	98.87	1.01	---	---	97.86	28.43	---	---	---	127.30
10.90	258,008	83.90	100.37	0.94	---	---	99.43	33.30	---	---	---	133.66
11.00	261,782	84.00	101.65	0.88	---	---	100.77	38.42	---	---	---	140.07
11.08	264,971	84.08	102.57	0.83	---	---	101.73	42.68	---	---	---	145.25
11.16	268,161	84.16	103.42	0.79	---	---	102.62	47.10	---	---	---	150.51
11.24	271,350	84.24	104.20	0.76	---	---	103.44	51.65	---	---	---	155.85
11.32	274,540	84.32	104.95	0.73	---	---	104.22	56.35	---	---	---	161.29
11.40	277,730	84.40	105.65	0.70	---	---	104.95	61.18	---	---	---	166.82
11.48	280,919	84.48	106.31	0.67	---	---	105.64	66.14	---	---	---	172.44
11.56	284,109	84.56	106.95	0.64	---	---	106.30	71.22	---	---	---	178.17
11.64	287,298	84.64	107.56	0.62	---	---	106.94	76.43	---	---	---	183.99
11.72	290,488	84.72	108.15	0.60	---	---	107.55	81.76	---	---	---	189.91
11.80	293,678	84.80	108.73	0.58	---	---	108.15	87.21	---	---	---	195.93

...End

# STORM SEWER SYSTEM #3 Hydraflow Plan View

8/19/04



Project file: stormsystem#3.stm

No. Lines: 1

08-16-2004



# Storm Sewer Tabulation

Station		Len	Drng Area		Rnoft coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	50.0	1.13	1.13	0.90	1.02	1.02	5.0	5.0	7.0	7.11	12.11	5.80	15	2.52	78.96	77.70	83.55	83.12	90.55	78.95	
<div>↑ LOWEIZED TO AVOID DRAINAGE CONFLICT WITH UTILITIES</div>																						

Project File: stormsystem#3.stm

Number of lines: 1

Run Date: 08-16-2004

NOTES: Intensity = 140.36 / (Inlet time + 19.80) ^ 0.93: Return period = 10 Yrs.

8/19/04

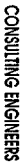


**WINDSORMEADE MARKETPLACE**  
9069  
**Spread Calc's**

	BY	BWS
1	1	1
2	1	1
3	1	1
4	1	1
5	1	1
6	1	1
7	1	1
8	1	1
9	1	1
10	1	1
11	1	1
12	1	1
13	1	1
14	1	1
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95	1	1
96	1	1
97	1	1
98	1	1
99	1	1
100	1	1

[illegible]

## NEW INLETS



(757) 253-0040  
Fax: (757) 220-8994

DATE  
BY

**BWS**

## DRAINAGE AREA REVISED

[illegible]



amsburg, Virginia 23188  
 (757) 253-0040  
 Fax: (757) 220-8994

PROJECT  
PROJECT NO.  
SUBJECT  
SHEET NO.  
DATE  
BY

**Spread Calc's**  
**1**  
**BWS**

# STORM WATER INLET COMPUTATIONS

[illegible]

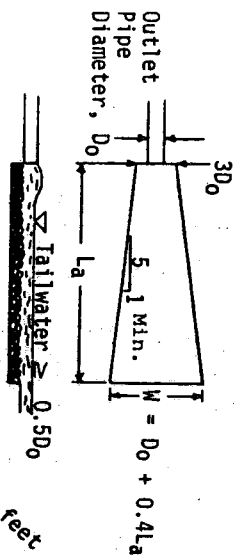
Outlet slope for emergency spillway  $Q_{100} = 23.63 \text{ cfs}$

Source: USDA-SCS

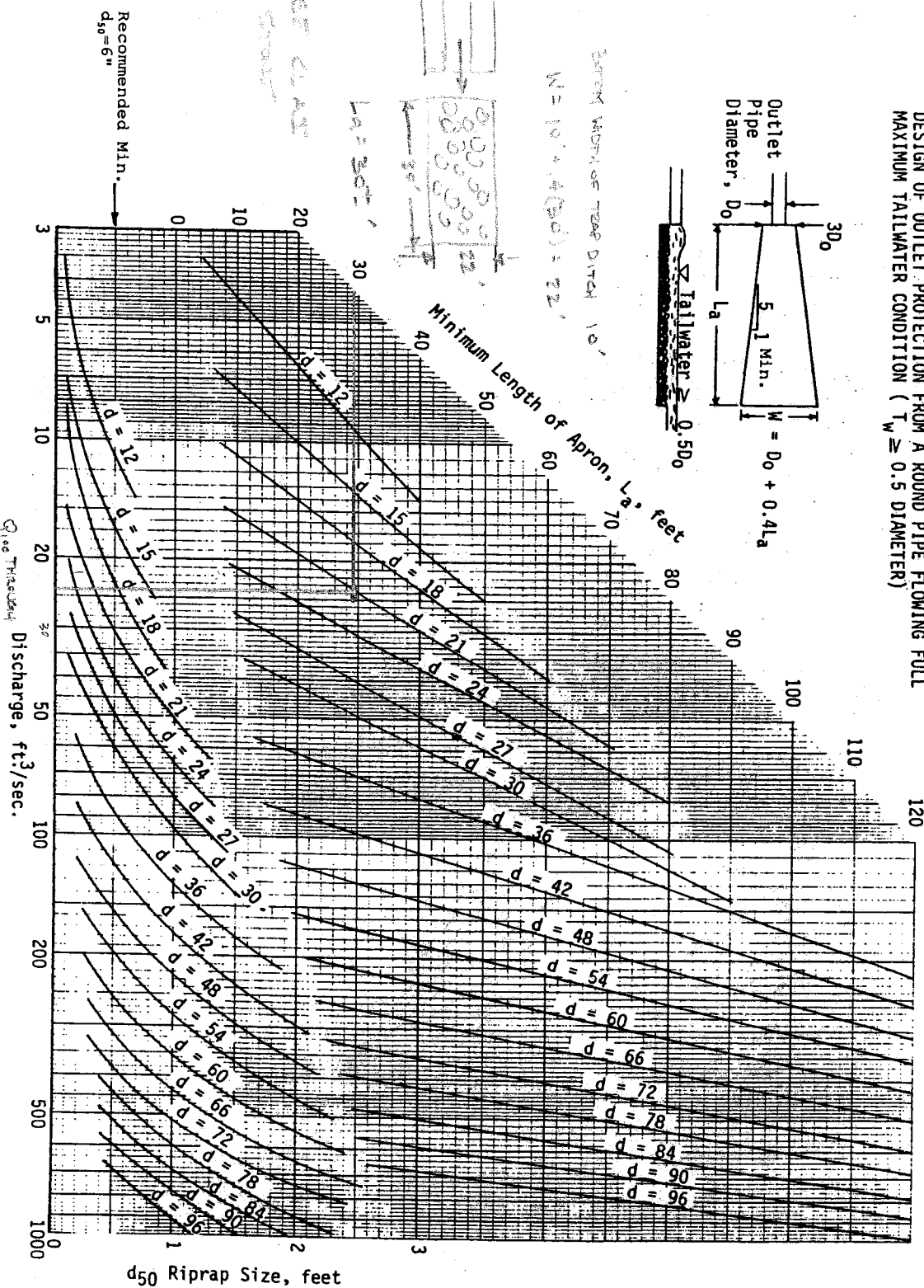
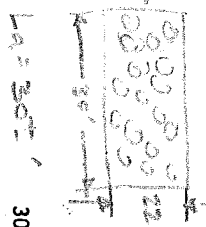
Plate 3.18-4

3.18

# DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL MAXIMUM TAILWATER CONDITION ( $T_w \geq 0.5$ DIAMETER)



Bottom width of trap ditch 10'  
 $W = 10' + 4(30') = 72'$



1992

# Pond Report

Hydraflow Hydrographs by Intelisolve

Tuesday, Aug 17 2004, 4:15 PM

## Pond No. 2 - WET POND

### Pond Data

Pond storage is based on known contour areas. Average end area method used.

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	73.00	6,701	0	0
1.00	74.00	12,612	9,657	9,657
2.00	75.00	13,689	13,151	22,807
3.00	76.00	14,799	14,244	37,051
4.00	77.00	15,942	15,371	52,422
5.00	78.00	22,057	19,000	71,421
6.00	79.00	27,489	24,773	96,194
7.00	80.00	29,673	28,581	124,775
8.00	81.00	31,917	30,795	155,570
9.00	82.00	34,224	33,071	188,641
10.00	83.00	36,580	35,402	224,043
11.00	84.00	38,898	37,739	261,782
11.80	84.80	40,842	31,896	293,678

### Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 36.00	6.00	0.00	0.00
Span (in)	= 36.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 72.72	77.45	0.00	0.00
Length (ft)	= 61.00	0.00	0.00	0.00
Slope (%)	= 1.18	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	Yes	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.56	10.00	0.00	0.00
Crest El. (ft)	= 81.90	82.90	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Riser	Ciplti	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

### Stage / Storage / Discharge Table

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	73.00	0.00	0.00	---	---	0.00	0.00	---	---	---	0.00
0.10	966	73.10	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
0.20	1,931	73.20	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
0.30	2,897	73.30	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
0.40	3,863	73.40	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
0.50	4,828	73.50	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
0.60	5,794	73.60	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
0.70	6,760	73.70	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
0.80	7,725	73.80	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
0.90	8,691	73.90	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.00	9,657	74.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.10	10,972	74.10	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.20	12,287	74.20	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.30	13,602	74.30	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.40	14,917	74.40	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.50	16,232	74.50	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.60	17,547	74.60	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.70	18,862	74.70	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.80	20,177	74.80	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
1.90	21,492	74.90	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.00	22,807	75.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.10	24,231	75.10	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.20	25,656	75.20	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.30	27,080	75.30	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.40	28,505	75.40	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00

Continues on next page...

## WET POND

## Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
2.50	29,929	75.50	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.60	31,353	75.60	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.70	32,778	75.70	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.80	34,202	75.80	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.90	35,627	75.90	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.00	37,051	76.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.10	38,588	76.10	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.20	40,125	76.20	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.30	41,662	76.30	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.40	43,199	76.40	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.50	44,736	76.50	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.60	46,273	76.60	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.70	47,810	76.70	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.80	49,347	76.80	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.90	50,884	76.90	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
4.00	52,422	77.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
4.10	54,321	77.10	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
4.20	56,221	77.20	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
4.30	58,121	77.30	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
4.40	60,021	77.40	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
4.50	61,921	77.50	0.62	0.01	---	---	0.00	0.00	---	---	---	0.01
4.60	63,821	77.60	0.62	0.07	---	---	0.00	0.00	---	---	---	0.07
4.70	65,721	77.70	0.62	0.17	---	---	0.00	0.00	---	---	---	0.17
4.80	67,621	77.80	0.62	0.30	---	---	0.00	0.00	---	---	---	0.30
4.90	69,521	77.90	0.62	0.43	---	---	0.00	0.00	---	---	---	0.43
5.00	71,421	78.00	0.62	0.52	---	---	0.00	0.00	---	---	---	0.52
5.10	73,898	78.10	0.62	0.60	---	---	0.00	0.00	---	---	---	0.60
5.20	76,376	78.20	0.67	0.67	---	---	0.00	0.00	---	---	---	0.67
5.30	78,853	78.30	0.74	0.73	---	---	0.00	0.00	---	---	---	0.73
5.40	81,330	78.40	0.81	0.79	---	---	0.00	0.00	---	---	---	0.79
5.50	83,807	78.50	0.88	0.85	---	---	0.00	0.00	---	---	---	0.85
5.60	86,285	78.60	0.90	0.90	---	---	0.00	0.00	---	---	---	0.90
5.70	88,762	78.70	0.96	0.95	---	---	0.00	0.00	---	---	---	0.95
5.80	91,239	78.80	1.04	0.99	---	---	0.00	0.00	---	---	---	0.99
5.90	93,717	78.90	1.04	1.04	---	---	0.00	0.00	---	---	---	1.04
6.00	96,194	79.00	1.13	1.08	---	---	0.00	0.00	---	---	---	1.08
6.10	99,052	79.10	1.13	1.12	---	---	0.00	0.00	---	---	---	1.12
6.20	101,910	79.20	1.22	1.16	---	---	0.00	0.00	---	---	---	1.16
6.30	104,768	79.30	1.22	1.20	---	---	0.00	0.00	---	---	---	1.20
6.40	107,626	79.40	1.23	1.23	---	---	0.00	0.00	---	---	---	1.23
6.50	110,485	79.50	1.32	1.27	---	---	0.00	0.00	---	---	---	1.27
6.60	113,343	79.60	1.32	1.30	---	---	0.00	0.00	---	---	---	1.30
6.70	116,201	79.70	1.34	1.34	---	---	0.00	0.00	---	---	---	1.34
6.80	119,059	79.80	1.42	1.37	---	---	0.00	0.00	---	---	---	1.37
6.90	121,917	79.90	1.42	1.40	---	---	0.00	0.00	---	---	---	1.40
7.00	124,775	80.00	1.43	1.43	---	---	0.00	0.00	---	---	---	1.43
7.10	127,855	80.10	1.53	1.46	---	---	0.00	0.00	---	---	---	1.46
7.20	130,934	80.20	1.53	1.49	---	---	0.00	0.00	---	---	---	1.49
7.30	134,014	80.30	1.53	1.52	---	---	0.00	0.00	---	---	---	1.52
7.40	137,093	80.40	1.55	1.55	---	---	0.00	0.00	---	---	---	1.55
7.50	140,173	80.50	1.64	1.58	---	---	0.00	0.00	---	---	---	1.58
7.60	143,252	80.60	1.64	1.61	---	---	0.00	0.00	---	---	---	1.61
7.70	146,332	80.70	1.64	1.64	---	---	0.00	0.00	---	---	---	1.64
7.80	149,411	80.80	1.66	1.66	---	---	0.00	0.00	---	---	---	1.66
7.90	152,491	80.90	1.76	1.69	---	---	0.00	0.00	---	---	---	1.69
8.00	155,570	81.00	1.76	1.72	---	---	0.00	0.00	---	---	---	1.72
8.10	158,877	81.10	1.76	1.74	---	---	0.00	0.00	---	---	---	1.74
8.20	162,184	81.20	1.77	1.77	---	---	0.00	0.00	---	---	---	1.77
8.30	165,491	81.30	1.79	1.79	---	---	0.00	0.00	---	---	---	1.79
8.40	168,798	81.40	1.89	1.82	---	---	0.00	0.00	---	---	---	1.82
8.50	172,105	81.50	1.89	1.84	---	---	0.00	0.00	---	---	---	1.84
8.60	175,412	81.60	1.89	1.87	---	---	0.00	0.00	---	---	---	1.87
8.70	178,719	81.70	1.89	1.89	---	---	0.00	0.00	---	---	---	1.89
8.80	182,026	81.80	1.91	1.91	---	---	0.00	0.00	---	---	---	1.91
8.90	185,333	81.90	2.02	1.94	---	---	0.00	0.00	---	---	---	1.94
9.00	188,641	82.00	3.30	1.96	---	---	1.32	0.00	---	---	---	3.28
9.10	192,181	82.10	5.74	1.98	---	---	3.74	0.00	---	---	---	5.72
9.20	195,721	82.20	9.01	2.01	---	---	6.87	0.00	---	---	---	8.88
9.30	199,261	82.30	12.63	2.03	---	---	10.58	0.00	---	---	---	12.61
9.40	202,801	82.40	17.14	2.05	---	---	14.79	0.00	---	---	---	16.84

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## WET POND

## Stage / Storage / Discharge Table

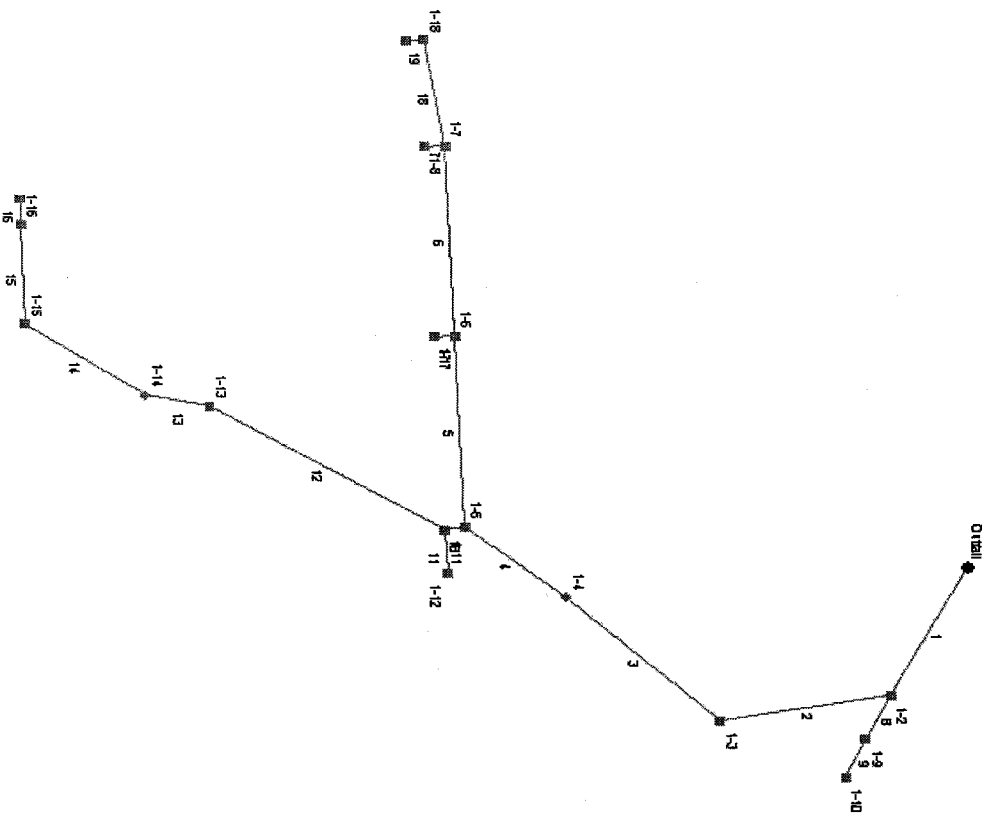
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
9.50	206,342	82.50	21.51	2.07	---	---	19.44	0.00	---	---	---	21.51
9.60	209,882	82.60	26.71	2.09	---	---	24.49	0.00	---	---	---	26.59
9.70	213,422	82.70	32.09	2.11	---	---	29.93	0.00	---	---	---	32.04
9.80	216,962	82.80	37.84	2.13	---	---	35.71	0.00	---	---	---	37.84
9.90	220,502	82.90	43.98	2.16	---	---	41.82	0.00	---	---	---	43.98
10.00	224,043	83.00	50.43	2.18	---	---	48.25	1.05	---	---	---	51.48
10.10	227,816	83.10	57.18	2.20	---	---	54.98	2.98	---	---	---	60.16
10.20	231,590	83.20	64.19	2.20	---	---	61.99	5.47	---	---	---	69.67
10.30	235,364	83.30	71.33	2.05	---	---	69.28	8.42	---	---	---	79.75
10.40	239,138	83.40	78.69	1.85	---	---	76.84	11.77	---	---	---	90.46
10.50	242,912	83.50	86.25	1.60	---	---	84.65	15.48	---	---	---	101.72
10.60	246,686	83.60	93.96	1.25	---	---	92.70	19.50	---	---	---	113.46
10.70	250,460	83.70	97.04	1.10	---	---	95.94	23.83	---	---	---	120.86
10.80	254,234	83.80	98.87	1.01	---	---	97.86	28.43	---	---	---	127.30
10.90	258,008	83.90	100.37	0.94	---	---	99.43	33.30	---	---	---	133.66
11.00	261,782	84.00	101.65	0.88	---	---	100.77	38.42	---	---	---	140.07
11.08	264,971	84.08	102.57	0.83	---	---	101.73	42.68	---	---	---	145.25
11.16	268,161	84.16	103.42	0.79	---	---	102.62	47.10	---	---	---	150.51
11.24	271,350	84.24	104.20	0.76	---	---	103.44	51.65	---	---	---	155.85
11.32	274,540	84.32	104.95	0.73	---	---	104.22	56.35	---	---	---	161.29
11.40	277,730	84.40	105.65	0.70	---	---	104.95	61.18	---	---	---	166.82
11.48	280,919	84.48	106.31	0.67	---	---	105.64	66.14	---	---	---	172.44
11.56	284,109	84.56	106.95	0.64	---	---	106.30	71.22	---	---	---	178.17
11.64	287,298	84.64	107.56	0.62	---	---	106.94	76.43	---	---	---	183.99
11.72	290,488	84.72	108.15	0.60	---	---	107.55	81.76	---	---	---	189.91
11.80	293,678	84.80	108.73	0.58	---	---	108.15	87.21	---	---	---	195.93

...End



# STORM SEWER SYSTEM #1 Hydraflow Plan View

8/19/04



Project file: stormsystem#1.stm

No. Lines: 19

08-18-2004

# Storm Sewer Tabulation

Station	Line	To Line	Len (ft)	Drng Area		Rnoff coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
				Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End		192.0	1.11	16.49	0.90	1.00	14.72	5.0	21.5	4.3	63.92	106.2	5.09	48	0.55	77.15	76.10	83.50	83.12	86.50	0.00	1-1 to 1-2
2	1		203.0	0.66	13.13	0.90	0.59	11.69	12.0	20.7	4.4	51.75	104.8	4.12	48	0.53	78.23	77.15	84.27	84.00	89.30	86.50	1-2 to 1-3
3	2		243.0	0.00	12.47	0.90	0.00	11.10	0.0	19.7	4.5	50.29	101.8	4.00	48	0.50	79.45	78.23	84.85	84.56	91.00	89.30	1-3 to 1-4
4	3		149.0	1.63	12.47	0.90	1.47	11.10	17.0	19.1	4.6	51.03	101.9	4.06	48	0.50	80.20	79.45	85.08	84.89	88.29	91.00	1-4 to 1-5
5	4		252.0	1.25	6.43	0.90	1.13	5.66	5.0	7.8	6.3	35.82	47.16	5.07	36	0.50	81.46	80.20	86.09	85.36	87.80	88.29	1-5 to 1-6
6	5		252.0	1.14	3.22	0.90	1.03	2.77	5.0	6.2	6.7	18.55	47.16	2.63	36	0.50	82.72	81.46	86.88	86.69	87.80	87.80	1-6 to 1-7
7	6		24.0	1.46	1.46	0.90	1.31	1.31	5.0	5.0	7.0	9.19	38.63	2.93	24	2.92	83.42	82.72	87.08	87.04	88.10	87.80	1-7 to 1-8
8	1		64.0	1.80	2.25	0.90	1.62	2.03	10.0	10.0	5.9	11.93	38.45	3.80	24	2.89	79.00	77.15	84.18	84.00	85.50	86.50	1-8 to 1-9
9	8		56.0	0.45	0.45	0.90	0.41	0.41	8.0	8.0	6.3	2.55	8.63	2.08	15	1.79	80.00	79.00	84.38	84.29	86.33	85.50	1-9 to 1-10
10	4		24.0	1.25	4.41	0.90	1.13	3.97	19.0	19.0	4.6	18.28	40.51	5.82	24	3.21	80.97	80.20	85.52	85.36	88.29	88.29	1-10 to 1-11
11	10		58.0	0.61	0.61	0.90	0.55	0.55	18.0	18.0	4.7	2.59	13.22	2.11	15	4.19	83.40	80.97	86.40	86.31	89.70	88.29	1-11 to 1-12
12	10		321.0	0.19	2.55	0.90	0.17	2.30	5.0	7.2	6.5	14.85	15.77	4.73	24	0.49	82.53	80.97	87.69	86.31	91.53	88.29	1-12 to 1-13
13	12		77.0	0.00	2.36	0.90	0.00	2.12	0.0	6.9	6.5	13.88	15.89	4.42	24	0.49	82.91	82.53	88.23	87.94	93.50	91.53	1-13 to 1-14
14	13		170.0	1.05	2.36	0.90	0.94	2.12	5.0	6.2	6.7	14.19	15.71	4.52	24	0.48	83.73	82.91	89.03	88.36	90.75	93.50	1-14 to 1-15
15	14		132.0	0.59	1.31	0.90	0.53	1.18	5.0	5.4	6.9	8.13	15.63	2.59	24	0.48	84.36	83.73	89.60	89.43	89.90	90.75	1-15 to 1-16
16	15		34.0	0.72	0.72	0.90	0.65	0.65	5.0	5.0	7.0	4.53	14.51	1.44	24	0.41	84.50	84.36	89.67	89.65	89.90	89.90	1-16 to 1-17
17	5		24.0	1.96	1.96	0.90	1.76	1.76	5.0	5.0	7.0	12.34	39.18	3.93	24	3.00	82.18	81.46	86.76	86.69	87.80	87.80	1-17 to 1-18
18	6		142.0	0.26	0.62	0.70	0.18	0.43	5.0	5.3	6.9	3.01	8.18	2.45	15	1.61	85.00	82.72	87.35	87.04	89.00	87.80	1-18 to 1-19
19	18		22.0	0.36	0.36	0.70	0.25	0.25	5.0	5.0	7.0	1.76	7.54	1.44	15	1.36	85.30	85.00	87.51	87.49	89.00	89.00	1-19 to 1-20

NEW DRAINAGE AREAS

OUTFALLS  
TO NEW  
STRUCTURES

Project File: stormsystem#1.stm

Number of lines: 19

Run Date: 08-18-2004

NOTES: Intensity = 140.36 / (inlet time + 19.80) ^ 0.93; Return period = 10 Yrs.

# ENVIRONMENTAL DIVISION PROJECT REVIEW and COMMENTS - TRACKING SLIP

Plan Type: ☐ C (Concept Plan) ☐ M (Master Plan) ☐ Other, Specify: \_\_\_\_\_  
☒ SP (Site Plan) ☐ SUP (Special Use Permit)  
☐ S (Subdivision) ☐ Z (Zoning)

☐ EXPEDITED REVIEW STATUS (TOP PRIORITY)  
☐ DRC Case REVIEW STATUS

## Project Information:

Case No.: SP - 67 - 05  
 Project Name: WINDSORMEADE MARKETPLACE - 2 PARCELS 9, 10 & 11  
 Planner: MATT ARUPI Extension: 687b  
☒ Original Plan (1<sup>st</sup> Submission, 1<sup>st</sup> Plan Review)  
☐ Revised Plan 1 (2<sup>nd</sup> Submission, 2<sup>nd</sup> Plan Review) ☐ Slip-Sheet to Env. Div.  
☐ Revised Plan 2 (3<sup>rd</sup> Submission, 3<sup>rd</sup> Plan Review) ☐ Amendment to Prev. Approved Plan  
☐ Revised Plan 3 (4<sup>th</sup> Submission, 4<sup>th</sup> Plan Review)

## Date Tracking:

Transmittal Date: MAY 20 '05 (from Planning)  
 Received Environmental Division: MAY 20 '05 (Date Stamped Env Div)  
 Due / Return Date (Planning): JUNE 3 '05 (Planning Return Date)  
 21 days from Transmittal Date: JUNE 10 '05 (Env Div Goal Date)  
 Erosion & Sediment Control Plan Review Complete: MAY 23 '05 (E&SC Review Complete)  
 Stormwater Management/Drainage Review Complete: JULY 6 '05 (SWM Review Complete)  
 Environmental Division Completion Date: JULY 6 '05 (All Personnel)  
☒ Forwarded to Planning  
☒ Email ☐ Fax to Professional  
Matt Arupri  
NIA

## Environmental Review Computer File Setup:

<input type="checkbox"/> Old Files	(Previous Reviews, Old Files)	File: _____
<input checked="" type="checkbox"/> Original Plan	(1 <sup>st</sup> Submission, 1 <sup>st</sup> Review)	File: <u>SP-67-05</u> .0
<input type="checkbox"/> Revised Plan 1	(2 <sup>nd</sup> Submission, 2 <sup>nd</sup> Review)	File: _____ .1
<input type="checkbox"/> Revised Plan 2	(3 <sup>rd</sup> Submission, 3 <sup>rd</sup> Review)	File: _____ .2
<input type="checkbox"/> Revised Plan 3	(4 <sup>th</sup> Submission, 4 <sup>th</sup> Review)	File: _____ .3

## Erosion & Sediment Control Plan Review (William A. Cain / Mike D. Woolson)

Date Received: MAY 20 '05 (Received for E&SC Plan Review)  
 Review Complete: MAY 23 '05 (E&SC Plan Review Complete)

## Stormwater Management / Drainage Plan Review (Scott J. Thomas)

Date Received: MAY 24 '05 (Received for SWM Plan Review)  
 Review Complete: JULY 06 '05 (SWM Plan Review Complete)

Comments: No Comments

OK FOR LAND-DISTURBING & FINAL SITE PLAN  
Approval

Scott  
07-06-05

Scott  
No comments  
Mike

**TRANSMITTAL**

**DATE:** May 20, 2005  
**TO:** Environmental\*  
Fire  
JCSA\*  
Wayland Bass  
VDOT  
Scott Whyte  
Real Estate  
Police

**FROM:** Matthew Arcieri, Senior Planner

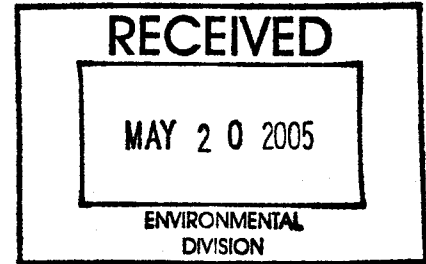
**SUBJECT:** SP-67-05, WindsorMeade Marketplace – Outparcels 9, 10 & 11

**ITEMS**

**ATTACHED:** Plan  
Calculations\*

**ACTION:** Please review and return comments by June 3, 2005.

Approved DEC 7/11/05



RECEIVED MAY 24 2005  
Due June 10

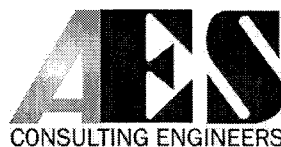


WindsorMeade Marketplace  
Outparcels 9, 10 and 11  
James City County Environmental

May 18, 2005

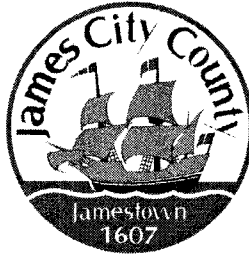
SP-67-05

Prepared by:



**AES Consulting Engineers**

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James City County, Virginia  
Environmental Division

**Erosion and Sediment Control and  
Stormwater Management Design Plan Checklists**

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GENERAL INFORMATION

Project Name: Windsormeade Marketplace (OUTPARCELS 9, 10, 11) ✓  
Owner / Applicant: AES  
Plan Preparer: Bryan Stevenson Email: bstevenson@aesva.com  
Project Location: Intersection of Monticello and Windsormeade Way Roads  
Tax Map / Parcel: \_\_\_\_\_  
County Plan No. (if known): SP-67-05  
County BMP Type: \_\_\_\_\_ ( \_\_\_\_\_ - \_\_\_\_\_ )

Other information submitted in addition to this checklist (Check all that apply):

- ☒ Design or Construction Drawings (Plans, Profiles, Details, etc.).
- ☒ Erosion & Sediment Control Plan (Plan, Details, etc.).
- ☐ Erosion & Sediment Control Plan Design Report.
- ☐ Stormwater Management Design Plan (Plans, Profiles, Details, etc.).
- ☐ Stormwater Management Design Report.
- ☐ Other, List: \_\_\_\_\_

*Issue Date*  
**March 1, 2001**

**JAMES CITY COUNTY, VIRGINIA  
ENVIRONMENTAL DIVISION**

***EROSION AND SEDIMENT CONTROL PLAN CHECKLIST***

**I. GENERAL:**

**Yes No N/A**

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <i>FAMILIARITY</i> with current versions of Chapter 8, Erosion and Sedimentation Control and Chapter 23, Chesapeake Bay Preservation ordinances of the Code of James City County, Virginia and the Virginia Erosion and Sediment Control Handbook (VESCH).  |
| <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <i>LAND DISTURBING PERMIT AND SILTATION AGREEMENT</i> with surety are required for the project.   |
| <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> | <i>VARIANCE</i> if necessary, requested in writing, for the plan approving authority to waive or modify any of the minimum standards and specifications of the VESCH deemed inappropriate based on site conditions specific to this review case only. Variances which are approved shall be properly documented in the plan and become part of the approved erosion and sediment control plan for the site. |

**II. SITE PLAN:**

**Yes No N/A**

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <i>VICINITY MAP</i> locating the site in relation to the surrounding area. Include any major landmarks which might assist in physically locating the site.  |
| <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <i>INDICATE NORTH</i> direction in relation to the site.  |
| <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <i>LIMITS OF CLEARING AND GRADING</i> for the site including that required for implementation of erosion and sediment controls, stockpile areas and utilities.  |
| <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <i>DISTURBED AREA ESTIMATES</i> in acres or square feet for the project.  |
| <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <i>EXISTING TOPOGRAPHY</i> or contours for the site at no more than 5 foot contour interval.  |
| <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <i>FINAL TOPOGRAPHY</i> , contours or proposed site grading in accordance with the design plan which indicates changes to existing topography and drainage patterns at no more than 2 foot contour interval (or 1 foot contours where required).                  |
| <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <i>EXISTING AND PROPOSED SPOT ELEVATIONS</i> to supplement existing and proposed contours, topography or site grading information. Spot elevations may replace final contours in some instances, especially if terrain is in a low lying area or relatively flat. |
| <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> | <i>EXISTING VEGETATION</i> including existing tree lines, grassed or unique vegetation areas.   |

Yes No N/A

- |                                     |                          |                                     |  |
|-------------------------------------|--------------------------|-------------------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <i>EXISTING SITE FEATURES</i> including roads, buildings, homes, utilities, streams, fences, structures and other important surface features of the site.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <i>SOILS MAP</i> with soil symbols, boundaries and legend in accordance with the current Soil Survey of James City and York Counties and the City of Williamsburg, Virginia.   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <i>ENVIRONMENTAL INVENTORY</i> in accordance with Section 23-10(2) of the Chesapeake Bay Preservation Ordinance of James City County. Inventory generally includes: tidal shores and wetlands, non-tidal wetlands, resource protection area, hydric soils and slopes steeper than 25 percent. For wetlands, provide a copy of issued permits or satisfactory evidence that appropriate permits are being pursued for the entire project.   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <i>100-YEAR FLOODPLAIN LIMITS</i> or any special flood hazard areas or flood zones based on appropriate Federal Management Agency Flood Insurance Rate Maps (FIRMS) or Flood Hazard Boundary Maps (FHBMs) of James City County, Virginia.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <i>DRAINAGE AREAS</i> for offsite and onsite areas, existing or proposed as applicable. Include drainage divides and directional labels for all subareas at points of interest and size (in acres), weighted runoff coefficient or curve number and times of concentration for each subarea.   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <i>CRITICAL EROSION AREAS</i> which require special consideration or unique erosion and sediment control measures. Refer to the VESCH, Chapter 6 for criteria.   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <i>DEVELOPMENT PLAN</i> for the site showing all improvements such as buildings, structures, parking areas, access roadways, above and below ground utilities, stormwater management and drainage facilities, trails or sidewalks, proposed vegetation and landscaping, amenities, etc.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <i>LOCATION OF PRACTICES</i> proposed for erosion and sediment control, tree protection and temporary stormwater management due to land disturbance activities at the site. Use standard abbreviations, labels and symbols consistent for plan views based on minimum standards and specifications in Chapter 3 of the VESCH.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <i>TEMPORARY STOCKPILE AREAS</i> or staging and equipment storage areas as required for onsite or offsite construction activities or indicate that none are anticipated for this project.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <i>OFFSITE LAND DISTURBING AREAS</i> including borrow sites, waste areas, utility extensions, etc. and required erosion and sediment controls. If none are anticipated for the project, then indicate on the plans by general or erosion and sediment control notes.   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <i>DETAILS</i> or alternately, appropriate reference to current minimum standards and specifications of the VESCH for each measure proposed for the project. Non-modified, standard duplicated details (silt fence, diversion dikes, etc.) may be referenced to the current version of the VESCH. Specific dimensional or modified standards (basins, traps, outlet protections, check dams, etc.) require presentation on detail sheets. Schedules or tables may be used for multiple site measures such as sediment traps, basins, channels, slope drains, etc. Any modification to standard details should be clearly defined, explained and illustrated. |



Yes No N/A

☒ ☐ ☐

*MAINTENANCE PLAN* or alternately, appropriate reference to current minimum standards and specifications of the VESCH, outlining the inspection frequency and maintenance requirements for all erosion and sediment control measures proposed for the project.

☐ ☐ ☒

*TRENCH DEWATERING* methods and erosion and sediment controls, if anticipated for the project.

☒ ☐ ☐

*CONSTRUCTION SEQUENCE* outlining the anticipated sequence for installation of erosion and sediment controls and site, grading and utility work to be performed for the project by the site contractor.

☒ ☐ ☐

*PHASING PLAN* if required for larger project sites that are to be developed in stages or phases.

☒ ☐ ☐

*STANDARD COUNTY NOTES* are required to be placed on the erosion and sediment control plan. Refer to the standard James City County Erosion and Sediment Control Notes dated May 5, 1999.

☒ ☐ ☐

*PROFESSIONAL SEAL AND SIGNATURE* required on final and complete approved plans, drawings, technical reports and specifications.

### III. NARRATIVE:

Yes No N/A

☒ ☐ ☐

*PROJECT DESCRIPTION* briefly describing the nature and purpose of the land disturbing activity and the acreage to be disturbed.

☒ ☐ ☐

*EXISTING SITE CONDITIONS* description of existing topography, land use, cover and drainage patterns at the site.

☒ ☐ ☐

*ADJACENT AREA* descriptions of neighboring onsite or offsite areas such as streams, lakes, property, roads, etc. and potential impacts due to concentrated flow or runoff from the land disturbing activity.

☐ ☐ ☒

*OFFSITE DISTURBED AREA* descriptions of proposed borrow sites, water or surplus areas, utility extensions and erosion and sediment controls to be implemented.

☒ ☐ ☐

*SOILS DESCRIPTION* briefly summarizing site, disturbed area and drainage basin soils including name, unit, hydrologic soil group (HSG) classification, surface runoff potential, erodibility, permeability, depth, texture, structure, erosion hazards, shrink-swell potential, limitations for use and anticipated depths to bedrock and the seasonal water table, as applicable.

☐ ☐ ☒

*CRITICAL AREAS* on the site which may have potentially serious erosion and sediment control problems and special considerations required (i.e. steep slopes, hydric soils, channels, springs, sinkholes, water supply reservoirs, groundwater recharge areas, etc.)

Yes No N/A

☒ ☐ ☐

*PROPOSED EROSION & SEDIMENT CONTROL MEASURES* inclusive to the specific erosion and sediment control plan as proposed for the land disturbing activity. Measures should be consistent with those proposed on the site drawings. Address general use, installation, limitations, sequencing and maintenance requirements for each control measure.

☒ ☐ ☐

*STABILIZATION MEASURES* required for the site, either temporary or permanent, and during and following construction including temporary and permanent seeding and mulching, paving, stone, soil stabilization blankets and matting, sodding, landscaping or special stabilization techniques to be utilized at the site.

☒ ☐ ☐

*STORMWATER MANAGEMENT CONSIDERATIONS* for the site, either of temporary or permanent nature, and strategies, sequences and measures required for control. May reference the stormwater management plan for the site, if prepared, for permanent stormwater management facilities and control of drainage once the site is stabilized.

#### IV. CALCULATIONS:

Yes No N/A

☐ ☐ ☒

*CALCULATIONS AND COMPUTATIONS* associated with hydrology, hydraulics and design of proposed temporary and permanent erosion and sediment control measures including: sediment traps and basins, diversions, stormwater conveyance channels, culverts, slope drains, outlet protections, etc. Computations are not required on the construction plan and may be attached in a supplemental erosion and sediment control plan design report, if presented in a clear and organized format.

☐ ☐ ☒

*TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET* submitted for each basin along with schematic or sketch cross-section showing applicable design and construction data, storage volumes (wet-dry), dimensions and elevations. Peak design runoff to be based on the 2- or 25-year design storm event based on maximum disturbed site conditions (existing, interim or proposed conditions) in accordance with Minimum Standard 3.14 of the VESCH.

**JAMES CITY COUNTY, VIRGINIA  
ENVIRONMENTAL DIVISION**

**STORMWATER MANAGEMENT DESIGN PLAN CHECKLIST**

**I. GENERAL:**

Yes No N/A

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <i>FAMILIARITY</i> with current versions of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual; Chapter 8, Erosion and Sediment Control and Chapter 23, Chesapeake Bay Preservation ordinances of the Code of James City County, Virginia; the Virginia Erosion and Sediment Control Handbook (VESCH); and the Virginia Stormwater Management Handbook (VSMH).      |
| <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> | <i>WAIVER OR EXCEPTION</i> if necessary, requested in writing, for the plan approving authority to waive or except the requirements of Chapter 23, Chesapeake Bay Preservation ordinance in accordance with procedure established in Sections 23-14 through 23-17 of the ordinance. Applies to the review case only.   |
| <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> | <i>VARIANCE REQUEST</i> if necessary, requested in writing for the plan approving authority to waive or modify any of the minimum standards and specifications of the VESCH deemed inappropriate based on site conditions specific to this review case only. Variances which are approved shall be properly documented in the plan and become part of the approved erosion and sediment control plan for the site. |
| <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <i>PROFESSIONAL SEAL AND SIGNATURE</i> required on final and complete approved stormwater management plans, drawings, technical reports and specifications.  |
| <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> | <i>WORKSHEET FOR BMP POINT SYSTEM</i> to ensure the stormwater management plan for the project attains at least 10 BMP points (New Development) or traditional pollutant load reduction computations per the Chesapeake Bay Local Assistance Manual (Redevelopment Only)   |
| <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> | <i>PROPOSED CONSERVATION EASEMENT AREAS</i> for any natural open space points claimed in the BMP worksheet.  |
| <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> | <i>INSPECTION/MAINTENANCE AGREEMENT</i> is required to be prepared and executed with the County for the project.   |
| <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> | <i>FEMA FIRM PANEL</i> reference with designated special flood hazard areas or zone designations associated with the site, as applicable.  |
| <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <i>DRAINAGE AREA MAP</i> at a maximum scale of 1"=200' scale showing drainage area boundaries for pre- and postdevelopment conditions and associated time of concentration flow paths. Labels to include drainage area size, runoff coefficient or curve number and time of concentration for each subarea shown on the map.   |

Yes No N/A

☒ ☐ ☐

*SOILS MAP* with soil symbols, boundaries and legend in accordance with the current Soil Survey of James City and York Counties and the City of Williamsburg, Virginia with approximate locations of the project site, BMPs and applicable drainage basins.

☒ ☐ ☐

*STORMWATER MANAGEMENT NARRATIVE* in a brief and simple format which describes the project; location; site and drainage basin soil characteristics; receiving water or drainage facility; existing site and drainage basin conditions (topography, land use, cover, slopes, etc.); proposed site development; proposed stormwater management and drainage plan including County BMP type selected; summary of hydrology and hydraulics; maintenance program; and any special assumptions utilized for development of the stormwater management and drainage design plan or computations.

☒ ☐ ☐

*TEMPORARY STORMWATER MANAGEMENT* (if applicable) for control of stormwater runoff encountered during construction activities in addition to measures provided in the erosion and sediment control plan or stormwater management/drainage plan for the site. Adequate protection measures or sequencing provided.

☐ ☐ ☒

*MODIFICATION PLAN* clearly defined for temporary sediment control structures which will be converted to permanent SWM/BMP structures. Includes appropriate hydrologic and hydraulic computations, conversions, sequencing and cleanout information or details. Normally related to primary control structures associated with dry detention or wet retention ponds. Normally not permitted for Group C or D categories such as bioretention, infiltration and filtering system facilities.

☒ ☐ ☐

*STORMWATER MANAGEMENT and DRAINAGE DESIGN REPORT* in a bound 8-1/2 x 11 inch size format. Report shall generally include a title sheet, date, project identification, owner and preparer information, table of contents, narrative, summaries and computations as required. Computations may include: backwater, closed conduit, headwater, hydraulic, hydraulic grade line, hydrology, inlet, open channel, storm sewer, water quality, extended detention or stream channel protection and multi-stage storm routing calculations, as applicable, for the project. Computation data may include hand or computer generated computations, maps or schematics. All information should be presented in a clear, easy to follow format and should closely match construction plan information.

☒ ☐ ☐

*PLAN VIEW* at 1 inch = 50 ft. scale or less (1" = 40', 1" = 30', etc.)

☒ ☐ ☐

North arrow and plan legend.

☒ ☐ ☐

Property lines.

☒ ☐ ☐

Adjacent property information.

☐ ☐ ☒

Existing site features and existing impervious cover areas.

☒ ☐ ☐

Impervious cover tabulations.

☒ ☐ ☐

Existing drainage facilities (natural or manmade)

☒ ☐ ☐

Existing environmentally sensitive areas (RPA, wetlands, floodplain, steep slopes, critical soils, buffers, etc.)

☒ ☐ ☐

Existing and proposed contours (1' or 2' contour interval) and spot elevations as necessary to define high and low topography.

☒ ☐ ☐

Existing and proposed easement locations.

Yes No N/A

☒ ☐ ☐

Proposed site improvements and proposed impervious cover areas.

☒ ☐ ☐

Proposed stormwater conveyance, drainage and management facilities with appropriate labeled construction data and information.

☐ ☐ ☐

Proposed landscaping and seeding plans (disturbed areas, pond interior, etc.)

☐ ☐ ☒

Proposed slope stabilization areas (riprap, blankets, mattings, walls, etc.)

☐ ☐ ☒

Delineation of permanent pools and the 1-, 2-, 10- and 100-year Design Water Surface Elevations.

☐ ☐ ☒

Delineation of ponding, headwater, surcharge or backwater areas which may affect adjacent existing or proposed buildings, structures or upstream adjacent properties.

☐ ☐ ☒

Test boring locations with reference surface elevations (if known).

☐ ☐ ☒

Risers, barrels, underdrains, overflows and outlet protections.

☐ ☐ ☒

Emergency spillway level section and outlet channel.

☐ ☐ ☒

Existing and proposed site utilities and protection measures.

☐ ☐ ☒

Erosion and sediment control measures (for site or BMP).

☐ ☐ ☒

Maintenance or access corridors to permanent stormwater management, BMP or drainage facilities.

## II. STORMWATER CONVEYANCE SYSTEMS:

Yes No N/A

☒ ☐ ☐

### PLAN VIEWS

☒ ☐ ☐

Storm drain lengths, sizes, types, classes and slopes for all segments.

Label directly on plan or use structure/pipe schedule.

☒ ☐ ☐

Access structure (inlets, manholes, junctions, etc.) rim elevations, inverts, type and required grate or top unit and lengths labeled.

☒ ☐ ☐

All structure numbers labeled.

☒ ☐ ☐

Adequate horizontal clearance from other site utilities or structures.

☐ ☒ ☐

**PROFILES** generally are not required but are encouraged to expedite review. If not provided, ensure all pipe segments have adequate minimum cover, do not exceed maximum depths of cover for the type/class of pipe specified and do not conflict with other site utilities or excavation areas.

☐ ☐ ☒

### DETAILS

☐ ☐ ☐

Typical storm drain bedding details or reference note.

☐ ☐ ☐

Standard details or reference note for all proposed access structure types (inlets, manholes, junctions, etc.).

☐ ☐ ☐

Inlet shaping detail or applicable reference note.

☐ ☐ ☐

Step detail or applicable reference note (if depth 4 ft. or more).

☐ ☐ ☐

Typical open channel details with designation, location, shape, type, bottom width, top width, lining, slope, length, side slope, and installation depth required for construction. Channel design data as necessary may also be included.

☐ ☐ ☐

Outlet protections at all pipe outfalls.

Yes No N/A  
☒ ☐ ☐

#### **STORMWATER CONVEYANCE SYSTEM COMPUTATIONS**

- ☒ ☐ ☐ Storm Sewer Design computations based on 10-year design event.  
☒ ☐ ☐ Hydraulic Grade Line computations based on 10-year design event.  
☒ ☐ ☐ Inlet computations based on current VDOT procedure for spread, ponding depth and grate size required.  
☐ ☐ ☒ Culvert Headwater computations. Design based on 10-year design storm event and check only for 100-year storm event.  
☐ ☐ ☒ Open Channel computations based on 2-year design event for velocity and 10-year design event for capacity.  
☒ ☐ ☐ Standard outlet protection or special energy dissipators.  
☐ ☐ ☒ Pipe thickness design computations, as required, for selected pipe type (live load, minimum cover, maximum height of cover, etc.).  
☐ ☐ ☒ Adequate channel computations for receiving channels (based on field measured channel section data).

### **III. STORMWATER MANAGEMENT/BMP FACILITIES:**

Yes No N/A  
☒ ☐ ☐

**HYDROLOGY** – An SCS based methodology is required for the design of stormwater management/BMP facilities with watersheds exceeding 20 acres. Under 20 acres, other generally accepted methodologies such as the modified rational, critical storm are allowable. Refer to Chapter 5 of the VESCH or Chapter 5 of the VSMH.

- ☒ ☐ ☐ Runoff Curve Number or Coefficient determinations: predeveloped and ultimate development land use scenarios.  
☒ ☐ ☐ Time of concentration: predeveloped and ultimate development indicating overland, shallow concentrated, and channel flow components (200 ft. maximum length for overland flow).  
☒ ☐ ☐ Hydrograph generation (tabular or graphical): pre- and postdevelopment conditions for the 1-, 2-, 10- and 100-year design storm events.

☐ ☐ ☒

#### **FACILITY CONFIGURATION and MINIMUM SEPARATIONS**

- ☐ ☐ ☐ Screening and layout consistent with Section 24-98(d) of the Chapter 24 Zoning ordinance (landscaping, screening, visibility, etc.).  
☒ ☐ ☐ Basic considerations for safety and unauthorized entry.  
☒ ☐ ☐ Proper length to width ratio (Typically 2H:1V).  
☒ ☐ ☐ Facilities with deep pools (4 feet or more in depth) provided with two benches. Fifteen (15) ft. safety bench outward from normal pool at maximum 6 percent slope and aquatic bench inward from normal shoreline below normal pool. Narrower widths may be considered on a case-by-case basis.  
☒ ☐ ☐ Pond buffer minimum 25 feet outward from maximum design WSEL. Additional setbacks may be required to permanent structures.  
☐ ☐ ☒ No trees, shrubs or woody plants within 15 feet of embankment toe or 25 feet from principal spillway structure.  
☒ ☐ ☐ Infiltration and filtering system facilities generally located at least 100 feet horizontally from any water supply well; 100 feet from any downslope building; and 25 feet from any upslope buildings, unless site specific investigation allows for reduced separation.

Yes No N/A

☒ ☐ ☐

#### HYDRAULIC COMPUTATIONS

- |                                     |                          |                                     |   |
|-------------------------------------|--------------------------|-------------------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Elevation- or Stage-Storage curve and/or tabular data.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Weir / Orifice Control – Extended Detention.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Weir / Orifice Control – riser 1-year control for channel protection.   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Weir / Orifice Control – riser 2-year control for quantity (if required).   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Weir / Orifice Control – riser 10-year control for quantity (if required).  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            | Inlet / Outlet (barrel) control – (All Storms).   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            | Check for barrel control prior to riser orifice flow to prevent slug flow-water hammer conditions.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Emergency spillway capacity and depth of flow.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Elevation – Discharge (Outlet Rating) curve and/or table. Provide all supporting calculations and/or design assumptions.                        |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Adequate channel computations for receiving channel. May be waived if facility is designed based on current Stream Channel Protection criteria. |

☒ ☐ ☐

#### POND or RESERVOIR ROUTING

- |                                     |                          |                                     |  |
|-------------------------------------|--------------------------|-------------------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Storage-Indication Routing of postdeveloped inflow hydrographs for the 1-, 2-, 10-, and 100-year design storms. Preference is for structure to discharge up to the 10-year storm through the principal spillway and pass the 100-year storm with a minimum 1 foot of freeboard through a combination principal and emergency spillways. If no emergency spillway is provided, riser must be large enough to pass the design high water flow and trash without overtopping the facility, have 3 square feet or more of cross-sectional area, contain a hood type inlet and have a minimum freeboard of 2 feet. Token spillways with minimum 8 ft. width are also recommended at or above the design 100-year storm elevation. |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Downstream hydrographs at established study points, if conditions warrant (i.e. facility discharge combined with uncontrolled bypass).   |

☒ ☐ ☐

#### MISCELLANEOUS COMPUTATIONS

- |                                     |                          |                                     |   |
|-------------------------------------|--------------------------|-------------------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Water quality volume for permanent pool based on selected BMP treatment volume (WQv).                               |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Water quality volume for extended detention base on selected BMP treatment volume (WQv) with drawdown computations. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Drawdown computations for the 1-year, 24 hour detention for stream channel protection criteria.                     |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Pond drain computations (within 24 hours).  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Anti-seep collar design (concrete preferred) or match material type.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Filter diaphragm design (or alternative method of controlling seepage).   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Riser / base structure flotation analyses. FS = 1.25 minimum.   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Downstream danger reach study and/or emergency action plan (if conditions warrant).                                 |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Upstream backwater analyses onto offsite adjacent property (if conditions warrant).                                 |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 100 year floodplain impacts (if conditions warrant).  |

Yes No N/A

☐ ☐ ☒

**GEOTECHNICAL REQUIREMENTS**

☐ ☐ ☐

Geotechnical Report with recommendations specific to BMP facility type selected. Report prepared by a registered professional engineer. Requires submission, review and approval prior to issuance of Land Disturbance Permit.

☐ ☐ ☐

Initial Feasibility Testing requirements satisfied as per Appendix E of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual. (Infiltration, Bioretention and Filtering System BMP types only).

☐ ☐ ☐

Concept Design Testing requirements satisfied as per Appendix E of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual. (Infiltration, Bioretention and Filtering System BMP types only).

☐ ☐ ☐

Minimum Boring locations: borrow area, pool area, principal control structure, top of facility near one abutment and emergency spillway if provided.

☐ ☐ ☐

Boring logs with Unified Soil Classification (ASTM D2487), soils descriptions and depths to bedrock and the seasonal water table indicated.

☐ ☐ ☐

Standard County Record Drawing/Construction Certification note provided on plan. *Note: It is understood that preparation of record drawings and construction certifications as required for project facilities may not necessarily be performed by the plan preparer. These components may be performed by others.*

☐ ☐ ☒

**PRINCIPAL SPILLWAY PROFILE AND ASSOCIATED DETAILS**

☐ ☐ ☐

**EXISTING GROUND AND PROPOSED GRADE**

☐ ☐ ☐

Embankment or excavation side slopes labeled (3H:1V maximum).

☐ ☐ ☐

Minimum top width labeled (per VESCH or VSMH requirements).

☐ ☐ ☐

Removal of unsuitable material under proposed facility (per Geotechnical Report requirements).



Yes No N/A

☐ ☐ ☒

*CORE TRENCH*

☐ ☐ ☐  
☐ ☐ ☐

Material (per plan or Geotechnical Report).

Bottom width (4' minimum or greater as dictated by Geotechnical Report recommendations).

☐ ☐ ☐  
☐ ☐ ☐

Side slopes (1:1 maximum steepness)

Depth (4' minimum or greater as dictated by Geotechnical Report).

☒ ☐ ☐

*PRINCIPAL CONTROL STRUCTURE. RISER OR SIMILAR STRUCTURE (DETAILS REQUIRED FOR ALL ITEMS)*

☒ ☐ ☐  
☒ ☐ ☐  
☒ ☐ ☐  
☒ ☐ ☐  
☒ ☐ ☐  
☒ ☐ ☐  
☒ ☐ ☐

Durable, watertight, resistant material (concrete preferred).

Riser diameter is at least 1.25 times larger than barrel diameter.

All pertinent dimensions and elevations shown.

Control orifice or weir dimensions and elevations shown.

Trash rack – removable – for each release.

Anti-vortex device, baffle or plate.

Riser base structure with dimensions and embedment specifications (concrete preferred).

☒ ☐ ☐

Interior access (steps, ladders, etc.) for maintenance for structures over 4 feet in height. Excessively high risers may need some form of exterior access on top portion.

☒ ☐ ☐

Low flow orifice with trash rack device.

☒ ☐ ☐

*PRINCIPAL CONTROL STRUCTURE OUTLET BARREL*

☒ ☐ ☐

Material (ASTM C-361 reinforced concrete pipe) with watertight joints. Prior approval required for all other pipe material (other RCP types, CMP, CPP, PVC, etc.).

☐ ☐ ☐

Support and bedding requirements for barrel – concrete cradles, etc. or as recommended by the Geotechnical Report.

☒ ☐ ☐

Pipe inverts, length, size, class and slope shown.

☒ ☐ ☐

Flared end section or endwall provided on barrel outlet.

☒ ☐ ☐

*SEEPAGE CONTROL*

☒ ☐ ☐

Phreatic line shown (4:1 slope measured from the intersection of the embankment and the principal spillway design high water).

☒ ☐ ☐

*ANTI-SEEP COLLARS*

☒ ☐ ☐

Anti-seep collar, concrete preferred.

☒ ☐ ☐

Size – 15 percent increase in length of saturation using outside pipe diameter.

☒ ☐ ☐

Spacing and location on barrel (located at least 2 feet from a pipe joint).

☐ ☐ ☒

*FILTER DIAPHRAGMS*

☐ ☐ ☐

Design based on latest NRCS design methods and certified by a professional engineer.

Yes No N/A

☒ ☐ ☐

*ELEVATION AND DIMENSIONAL DESIGN DATA*

- ☐ ☐ ☒ Top of facility – construction height and settled height (10 percent settlement).
- ☐ ☐ ☒ Crest of principal control structure spillway at least one (1) foot below crest of emergency spillway, if provided.
- ☐ ☐ ☒ Minimum freeboard of one (1) foot above the 100-year design high water elevation for facilities with an emergency spillway.
- ☒ ☐ ☐ Minimum freeboard of two (2) feet above the 100-year design high water elevation for facilities without an emergency spillway or in accordance with the SCS National Engineering Handbook (prior approval required).
- ☒ ☐ ☐ Basin Sediment Clean-Out elevation (permanent mode). Typically 10 to 25 percent of water quality volume.

☒ ☐ ☐

*CROSS SECTION THROUGH FACILITY*

- ☒ ☐ ☐ Existing Ground.
- ☒ ☐ ☐ Proposed grade.
- ☒ ☐ ☐ Top of facility – constructed and settled.
- ☐ ☐ ☒ Location of emergency spillway with side slopes labeled (emergency spillway in cut).
- ☐ ☐ ☒ Bottom of core trench (4' minimum).
- ☐ ☐ ☐ Location of each soil boring.
- ☒ ☐ ☐ Barrel location.
- ☐ ☐ ☒ Existing and proposed utility location/protection.

☐ ☐ ☒

*EMERGENCY SPILLWAY PROFILE*

- ☐ ☐ ☐ Existing ground.
- ☐ ☐ ☐ Inlet, level (control) and outlet sections per SCS.
- ☐ ☐ ☐ Spillway and crest elevations.

☒ ☐ ☐

*PRETREATMENT DEVICES* of adequate depth and properly designed using required pretreatment volumes for the selected County BMP facility type. Including, but not limited to: sediment forebays, sediment basins, sumps, grass channels, gravel diaphragms, plunge pools, chamber separators, manufactured systems or other acceptable methods.

Yes No N/A

☒ ☐ ☐

#### CONSTRUCTION SPECIFICATIONS and NOTES

- |                                     |                          |                                     |   |
|-------------------------------------|--------------------------|-------------------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Anticipated sequence of construction for BMP (consistent with erosion and sediment control plan). |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Provisions to control base stream or storm flow conditions encountered during construction.       |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Site and subgrade preparation requirements.   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Embankment, fill and backfill material soil and placement (lift) thickness requirements.          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Compaction and soil moisture content requirements.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Geosynthetics for drainage, filtration, moisture barrier, separation, and reinforcement purposes. |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Clay or synthetic (PVC or HDPE) pond liners.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Storm drain, underdrain and pipe conduit requirements.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Minimum depth of pipe cover for temporary (construction) and final cover conditions.              |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Permanent shutoff valve and pond drain.   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Concrete requirements for structural components.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Riprap and slope protection.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Access or maintenance road surface, base, subbase.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Temporary and permanent stabilization measures.   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Temporary or permanent safety fencing.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            | BMP Landscaping (deep, shallow, fringe, perimeter, etc.)  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Dust and traffic control (if warranted).  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            | Construction monitoring and certification by professional.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            | Other: _____  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            | Other: _____  |

☒ ☐ ☐

#### MAINTENANCE PROVISIONS

- |                                     |                          |                                     |   |
|-------------------------------------|--------------------------|-------------------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Entity responsible for maintenance identified.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Maintenance Plan which outlines the long-term schedule for inspection/maintenance of the facility and forebays.   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Maintenance access from public right-of-way or publicly traveled road.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Maintenance easement provided encompassing high water pool and buffer, principal and emergency spillways, outlet structures, forebays, embankment area and possible sediment-removal stockpile areas. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Minimum 6 foot wide public safety shelf (landing) or alternative fencing.   |

IV. **OUTLET PROTECTIONS:**

Yes	No	N/A
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Sized for maximum design release (generally 10-year storm).

Flared end section or endwall.

Dimensions.

Rock or riprap size, quantity and placement thickness.

Slope at 0 percent (Level Grade).

Geotextiles (nonwoven).

Special energy dissipators are required for design discharge velocities that exceed eighteen (18) feet per second; or if use of standard outlet protection would result in velocities exceeding permissible channel velocities; or if space restricts or limits their use.

IV. **ADDITIONAL COMMENTS OR INFORMATION SPECIFIC TO THE PLAN:**

We provided new computations for the increase in drainage area (0.04 Ac) for the BMP#1 and revisions to Storm sewer system #1. The increase in drainage resulted in the 100 year storm in the basin to increase by a height of 0.01'.

Plan Preparer: BWS

Date: 4/22/05

Copy of JCC: SWMProg/BMP/Checklist/ChkList

**CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION  
FOR SWMP POND #1  
WINDSORMEADE MARKETPLACE  
AES Project No.:9069-02  
December 20, 2003  
REV: April 25, 2005**

**I. PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN**

- A. Pre-Development Drainage Area to Point of Concern = **13.90 Acres**  
 B. Pre-development Land Use, Soil Classification and Calculation of Composite Curve Number

	Soil Type	Soil Hydrologic Group	Post-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	20-B	B	woods, good condition	0.21	58.0	12
3)	11-B, 11-C, 14-B, 14-C, 15-D, 15-E, 15-F, 29-A	C	woods, good condition	12.11	72.0	872
4)	11C, 20-B, 34-C	D	wwods, good condition	1.60	79	126
Total Adjusted CN =				13.92		1,011
Composite CN =						73
C.	Pre-Development Time of Concentration Calculations					
1)	Overland Flow (maximum 300 feet)					
	Surface description (table 5-7)					
	Manning's roughness coefficient, n (table 5-7)					
	Length of overland flow, L					
	2-year 24-hour rainfall, P2					
	Average slope of overland flow, s					
	Travel time, $T_t = (0.007 * (n * L)^{0.8}) / (P2^{0.5} * s^{0.4})$					
						Woods, Good Cond.
						0.4
						250 Feet
						3.5 inches
						0.04 feet per foot
						0.54 hours
2)	Shallow concentrated flow (maximum 300 feet)					
	Surface description, paved or unpaved					
	Length of shallow concentrated flow, L					
	Average slope of shallow concentrated flow, s					
	Average velocity, v					
	Travel time, $T_t = L / (3600 * v)$					
						Wooded, Good Cond.
						300 Feet
						0.03 feet per foot
						2.8 feet per second
						0.03 hours
3)	Channel or Pipe Flow					
	Length of channel flow, L					
	Average velocity of channel flow, v					
	Travel time, $T_t = L / (3600 * v)$					
						0 Feet
						2.5 feet per second
						0.00 hours
Total Time of Concentration =				or		0.57 hours
						34 minutes

## II. POST-DEVELOPMENT CONDITIONS TO POINT OF CONCERN (for total site and Off-site Contributing Areas)

- A. Post-Development Drainage Area to Point of Concern =  
 B. Post-development Land Use, Soil Classification and Calculation of Composite Curve Number

INCREASED BY 0.04 AC  
 WITH THIS PLAN  
 20.94 Acres

	Soil Type	Soil Hydrologic Group	Post-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	20-B	C	woods, good condition	1.91	72.0	138
3)	11-B, 11-C, 14-B, 14-C, 15-D, 15-E, 15-F, 29-A, 10-C	A	commercial	1.28	89.0	114
4)	11C, 20-B, 34-C	B	commercial	0.29	90	26
6)	11-B, 11-C, 14-B, 14-C, 15-D, 15-E, 15-F, 29-A	C	commercial	16.20	94	1,523
7)	20-B	D	commercial	1.26	95	120
Total Adjusted CN =				20.94		1,920
Composite CN =						92

### C. Post-Development Time of Concentration Calculations

1)	Overland Flow (maximum 300 feet) Surface description (table 5-7) Manning's roughness coefficient, n (table 5-7) Length of overland flow, L 2-year 24-hour rainfall, P2 Average slope of overland flow, s Travel time, $T_t = (0.007 * (n * L)^{0.8}) / (P2^{0.5} * s^{0.4})$	Woods, good condition 0.4 100 Feet 3.5 inches 0.03 feet per foot 0.29 hours
2)	Shallow concentrated flow (maximum 300 feet) Surface description, paved or unpaved Length of shallow concentrated flow, L Average slope of shallow concentrated flow, s Average velocity, v Travel time, $T_t = L / (3600 * v)$	paved 115 Feet 0.01 feet per foot 2.00 feet per second 0.02 hours
3)	Channel or Pipe Flow Length of channel flow, L Average velocity of channel flow, v Travel time, $T_t = L / (3600 * v)$	812 Feet 5.6 feet per second 0.04 hours

Total Time of Concentration =

or 0.35 hours  
21 minutes

## III. PROPOSED ESTIMATED POND(S) VOLUME

Elevation	Depth	Area (sq. ft.)	Incremental Volume (cu. ft.)	Inc. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
73	0	6701	0	0	0	0
74	1	12,612	9,657	358	9,657	358
75	1	13,689	13,151	487	22,807	845
76	1	14,799	14,244	528	37,051	1,372
77	1	15,942	15,371	569	52,422	1,942
78	1	22,057	19,000	704	71,421	2,645
79	1	27,489	24,773	918	96,194	3,563
80	1	29,673	28,581	1,059	124,775	4,621
81	1	31,917	30,795	1,141	155,570	5,762
82	1	34,224	33,071	1,225	188,641	6,987
83	1	36,580	35,402	1,311	224,043	8,298
84	1	38,898	37,739	1,398	261,782	9,696
85	1	40,842	39,870	1,477	301,652	11,172

#### IV. DETERMINING REQUIRED WATER QUALITY VOLUME

Due to preliminary considerations, it is desired to provide this site extended detention wet pond to achieve a 10 point BMP rating for the facility. Under the James City County guide lines for storm water management BMPs, the extended detention wet pond may have one half of the water quality volume stored in the permanent pool and one half of the water quality volume released in a 24-hour period.

Percent Impervious of the BMP Watershed, Post-Development	76.0%	
Drainage Area of the BMP Watershed	20.94	acres
Impervious Acres of BMP Watershed	15.92	acres
Calculation for Water Quality Volume, WQ		
WQ <sub>v</sub> = (2.0 inches per impervious acre) *( impervious acres of BMP watershed)		
WQ <sub>v</sub> = (2.0 inches)*( 1 ft / 12 inches) *(43560 sq. Ft per acre) *(impervious acres of BMP watershed)		
WQ <sub>v</sub> = (2.0 inches)*( 1 ft / 12 inches) *(43560 sq. Ft per acre) *	16.80	= 121968 cu. Ft
WQ <sub>v</sub> =	60984 cu. Ft	Required Volume for Permanent Pool
	60984 cu. Ft	Design Volume for Dry Storage
		(1" per Impervious Acre)
WQ <sub>v</sub> (provided)=	60984 cu. Ft	Water Quality Volume Provided for Wet pool
	124350 cu. Ft	Water Quality Volume Provided for Dry pool
	185334	Total Water quality volume
Elevation of total WQ <sub>v</sub> =	81.9	
Elevation of release inlet for 1/2 water quality volume =	77.5	
Average head, in feet, on release inlet =	2.2	
Average release rate calculation	<div><div><div>124,350.0 cubic feet</div><div>(24 hours x 60 minutes/hour x 60 seconds/ minute)</div></div><div>=</div><div>1.4 cfs</div></div>	
Calculation of size of release inlet for 1/2 Water Quality Volume		
Diameter of Release Inlet = 2 * ( Q / ((64.32 * (h / 2)) ^ (1/2) * 0.6 * 3.14))) ^ (1/2)		
where, Q equals Average Release Rate, in cfs		
h equals Average Head, in feet		

**Note: A design with an orifice size of 6" will be used for channel protection requirements**

AES Project No. 9069  
Job Title BMP No. 1

Area=	20.94 Acres	0.0327sq.mi.
CN=	91	
Tc=	0.350 hr.	
P=	2.8 in.	Rainfall depth for 1yr return period
Ia=	0.198	Initial abstraction is all losses before runoff begins. ie surface depressions, water intercepted by vegetation, evaporation.....(See TR55 Chapter 2, Equation 2-1)
Qu=	630.41 csm/in	Unit Peak Discharge - Peak discharge per square mile per inch of runoff (Units are "cubic square miles per ing
Direct Runoff=	1.9 in.	Runoff in inches (See TR55 Chapter 2, Equation 2-1)
Qi=	38.89 cfs	Peak Inflow Discharge
Qo/Qi=	0.028	Ratio of Peak Inflow Discharge to Peak Outflow Discharge (See TR55 Chapter 6)
Qo=	1.08 cfs	Peak Outflow Discharge (See TR55 Chapter 6) Taken from Maryland Dept. of Stormwater Management Appendix D.11, figured.11.2. The curve for 24hr detention used in Chart 1 was scaled and a curve was fit to the data points. The resulting equation, which appears on the chart yields a very good fit.
Vs/Vr=	0.644	Ratio of Volume Stored to Volume Realeased (See TR55 Chapter 6). Value Computed
Vs=	2.117 Ac-Ft	using equation for Figure 6-1 as shown in Appendix F.
Vs=	92,232 cu.ft.	Required Storage Volume

Average Flow Rate (Qo) 1.08 cfs  
Average head= 1.55 ft.

Area of orifice= 0.18 sq.ft.

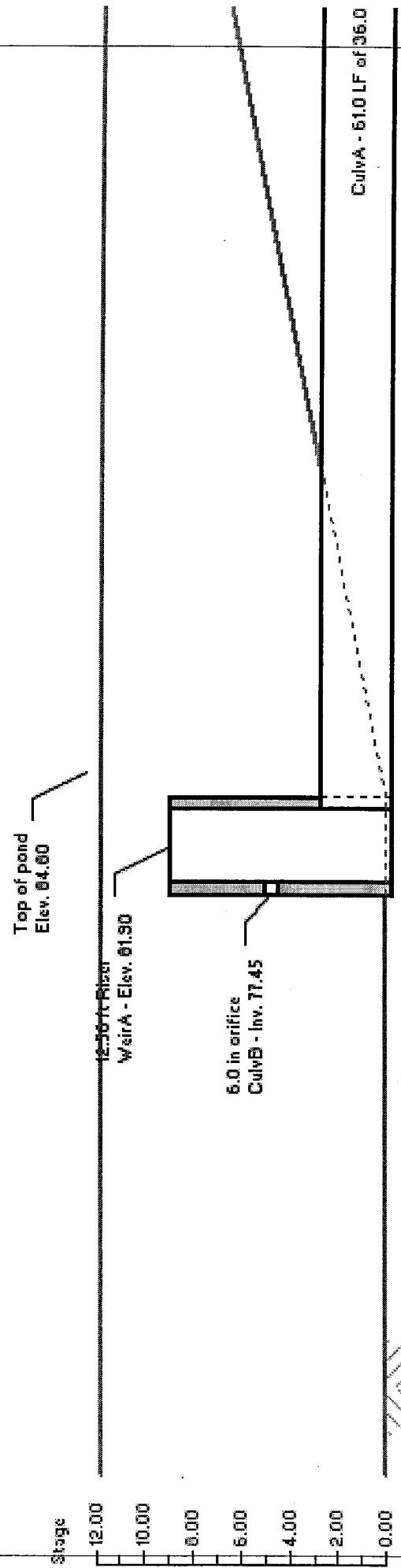
Orifice diameter = 0.48 ft.  
Orifice diameter = 5.8 in.

This offers a place to start. After routing the 1yr storm through the oriface check the out put to make sure that the Required Storage Volume is actually detained for 24 hours. If not adjust the orifice size and recompute.



REVISION TO BMP #1 FOR DRAINAGE INCREASE OF 2.00%

# WET POND



TAILWATER DEFAULTS TO ZERO WHEN ELEVATION DOES NOT EXCEED 72.72 (INVERT)

## Section NTS

Side slope estimated average from contours

Schematic only. Not for construction.

Hydraflow Hydrographs Pond Draw	Project: bmp#1 revised 4_23_05.GPW	Wednesday, May 18 2005, 9:10 AM
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# Pond Report

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:17 AM

## Pond No. 2 - WET POND

### Pond Data

Pond storage is based on known contour areas. Average end area method used.

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	73.00	6,701	0	0
1.00	74.00	12,612	9,657	9,657
2.00	75.00	13,689	13,151	22,807
3.00	76.00	14,799	14,244	37,051
4.00	77.00	15,942	15,371	52,422
5.00	78.00	22,057	19,000	71,421
6.00	79.00	27,489	24,773	96,194
7.00	80.00	29,673	28,581	124,775
8.00	81.00	31,917	30,795	155,570
9.00	82.00	34,224	33,071	188,641
10.00	83.00	36,580	35,402	224,043
11.00	84.00	38,898	37,739	261,782
11.80	84.80	40,842	31,896	293,678

### Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 36.00	6.00	0.00	0.00
Span (in)	= 36.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 72.72	77.45	0.00	0.00
Length (ft)	= 61.00	0.00	0.00	0.00
Slope (%)	= 1.18	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	Yes	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.56	10.00	0.00	0.00
Crest El. (ft)	= 81.90	82.90	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Riser	Cipiti	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.

### Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	73.00	0.00	0.00	---	---	0.00	0.00	---	---	---	0.00
1.00	9,657	74.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.00	22,807	75.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.00	37,051	76.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
4.00	52,422	77.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
5.00	71,421	78.00	0.62	0.52	---	---	0.00	0.00	---	---	---	0.52
6.00	96,194	79.00	1.13	1.08	---	---	0.00	0.00	---	---	---	1.08
7.00	124,775	80.00	1.43	1.43	---	---	0.00	0.00	---	---	---	1.43
8.00	155,570	81.00	1.76	1.72	---	---	0.00	0.00	---	---	---	1.72
9.00	188,641	82.00	3.30	1.96	---	---	1.32	0.00	---	---	---	3.28
10.00	224,043	83.00	50.43	2.18	---	---	48.25	1.05	---	---	---	51.48
11.00	261,782	84.00	101.65	0.88	---	---	100.77	38.42	---	---	---	140.07
11.80	293,678	84.80	108.73	0.58	---	---	108.15	87.21	---	---	---	195.93

# Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-----	7.11	12.21	-----	-----	31.96	37.56	-----	52.98	PRE-DEVELOPMENT
2	SCS Runoff	-----	43.73	57.82	-----	-----	103.74	115.60	-----	147.05	9069POST-DEVELOPMENT
5	Reservoir	2	1.75	3.81	-----	-----	62.45	80.42	-----	121.09	wet pond

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	7.11	2	736	36,768	---	----	----	PRE-DEVELOPMENT
2	SCS Runoff	43.73	2	726	152,637	---	----	----	9069POST-DEVELOPMENT
5	Reservoir	1.75	2	902	151,398	2	81.12 <i>PREVIOUS 81.11</i>	159,576	wet pond
bmp#1 revised 4_23_05.GPW					Return Period: 1 Year			Wednesday, May 18 2005, 9:08 AM	

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:32 AM

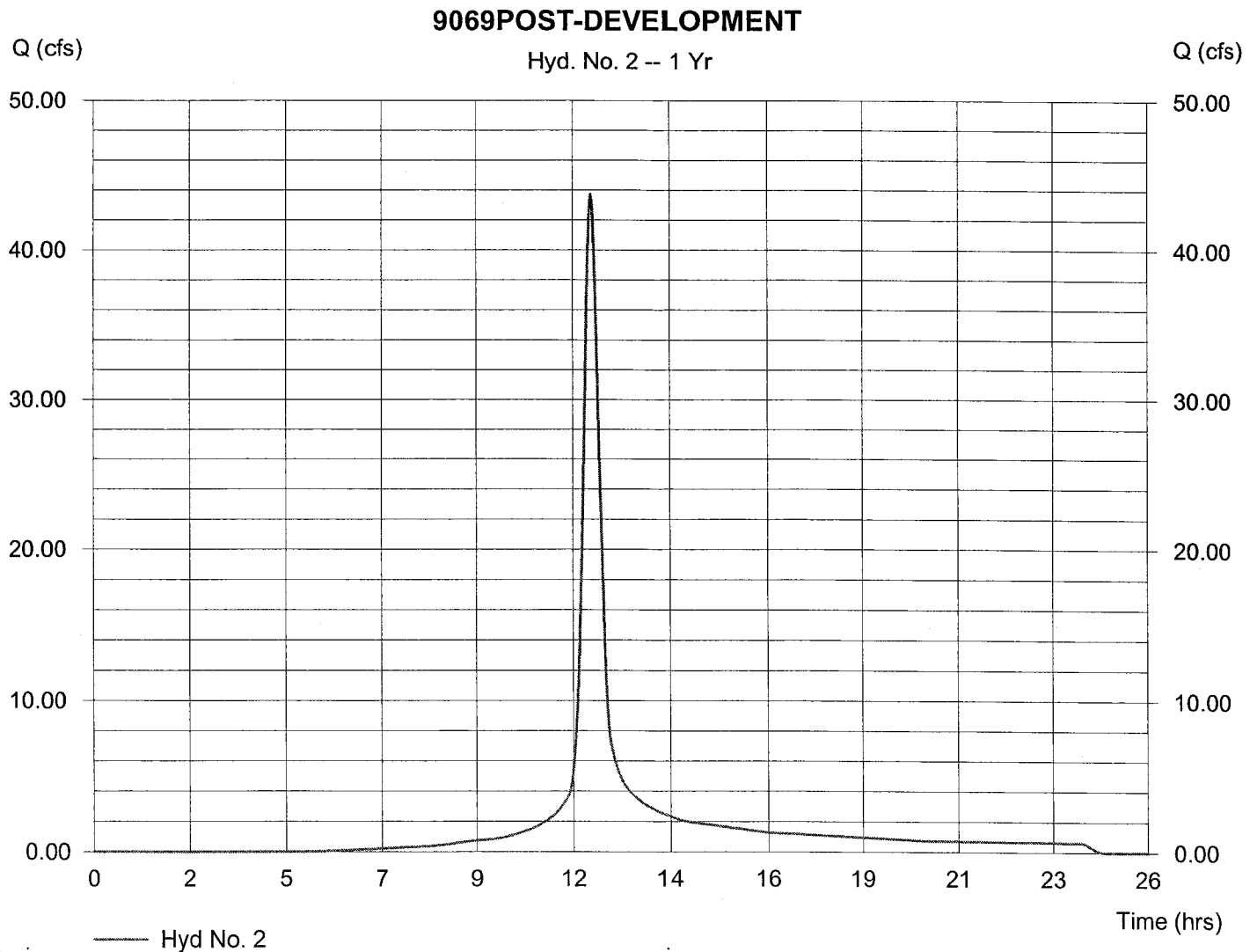
## Hyd. No. 2

### 9069POST-DEVELOPMENT

Hydrograph type = SCS Runoff  
Storm frequency = 1 yrs  
Drainage area = 20.94 ac PREVIOUSLY 22.9  
Basin Slope = 2.0 %  
Tc method = USER  
Total precip. = 2.80 in  
Storm duration = 24 hrs

Peak discharge = 43.73 cfs  
Time interval = 2 min  
Curve number = 92  
Hydraulic length = 3000 ft  
Time of conc. (Tc) = 21 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 152,637 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:28 AM

## Hyd. No. 5

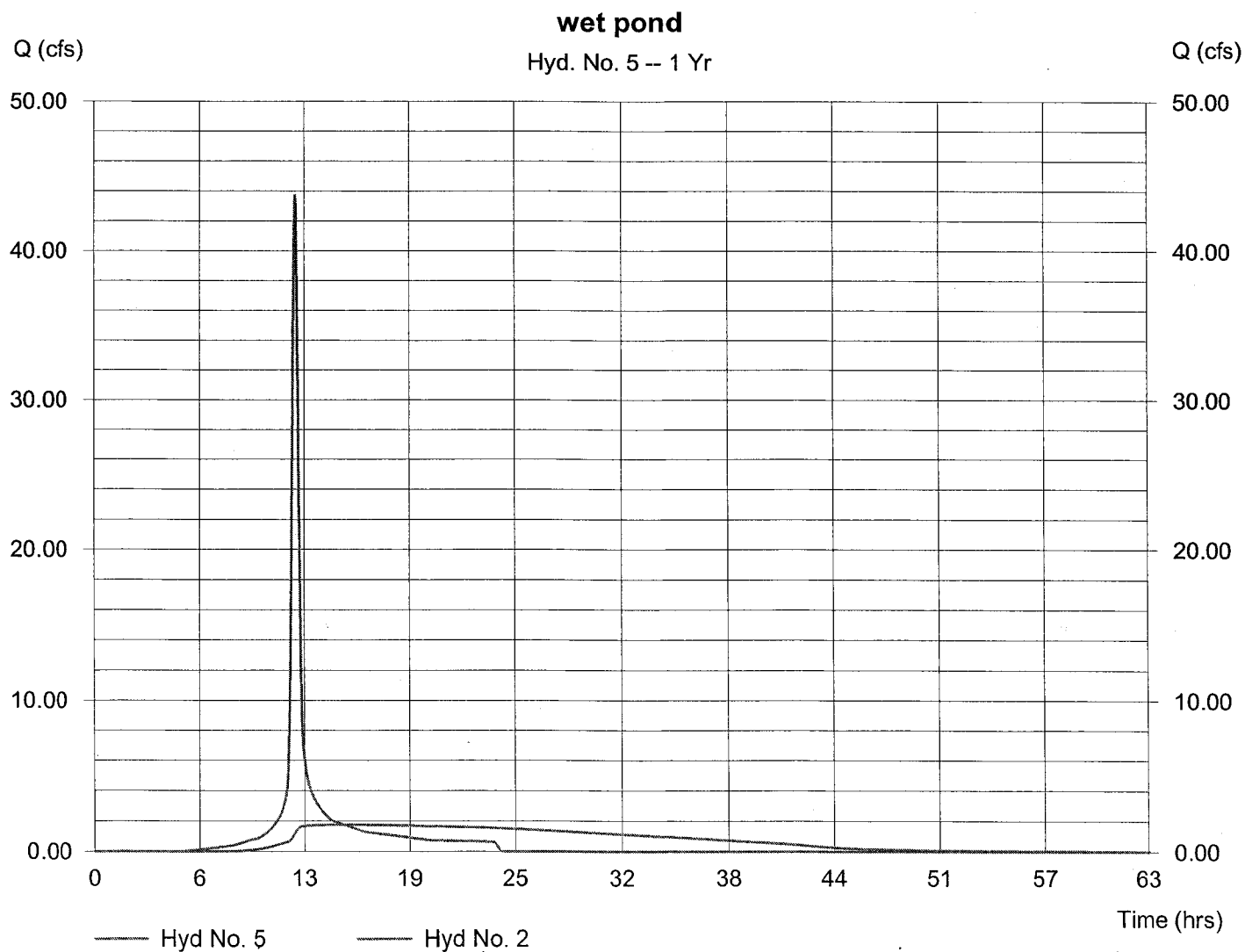
wet pond

Hydrograph type = Reservoir  
Storm frequency = 1 yrs  
Inflow hyd. No. = 2  
Reservoir name = WET POND

Peak discharge = 1.75 cfs  
Time interval = 2 min  
Max. Elevation = 81.12 ft  
Max. Storage = 159,576 cuft

Storage Indication method used. Wet pond routing start elevation = 77.40 ft.

Hydrograph Volume = 151,398 cuft



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	12.21	2	736	58,844	---	-----	-----	PRE-DEVELOPMENT
2	SCS Runoff	57.82	2	726	204,004	---	-----	-----	9069POST-DEVELOPMENT
5	Reservoir	3.81	2	812	202,670	2	82.02 NO CHANGE	189,404	wet pond
bmp#1 revised 4_23_05.GPW					Return Period: 2 Year			Wednesday, May 18 2005, 9:08 AM	

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:32 AM

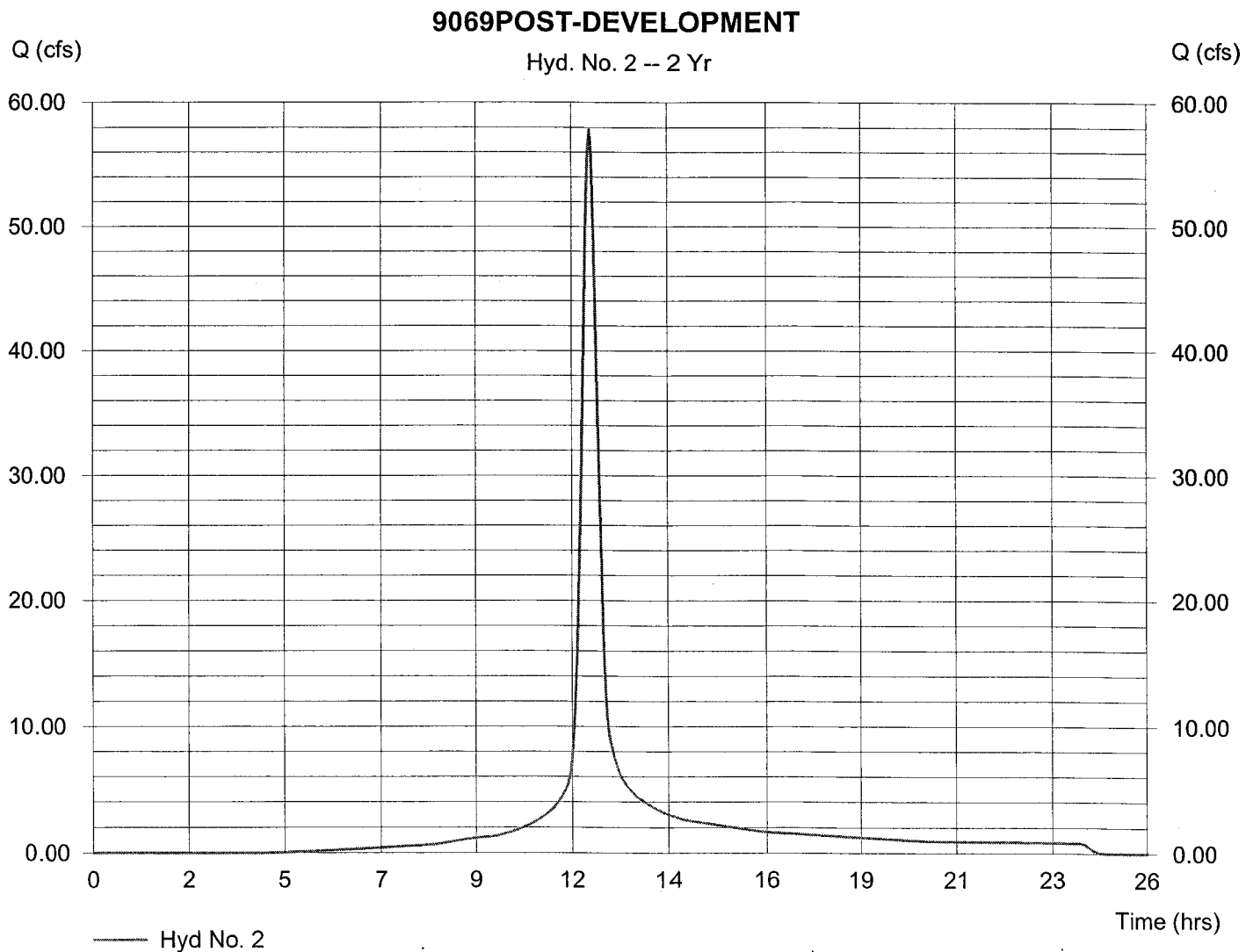
## Hyd. No. 2

### 9069POST-DEVELOPMENT

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 20.94 ac  
Basin Slope = 2.0 %  
Tc method = USER  
Total precip. = 3.50 in  
Storm duration = 24 hrs

Peak discharge = 57.82 cfs  
Time interval = 2 min  
Curve number = 92  
Hydraulic length = 3000 ft  
Time of conc. (Tc) = 21 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 204,004 cuft





# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:28 AM

## Hyd. No. 5

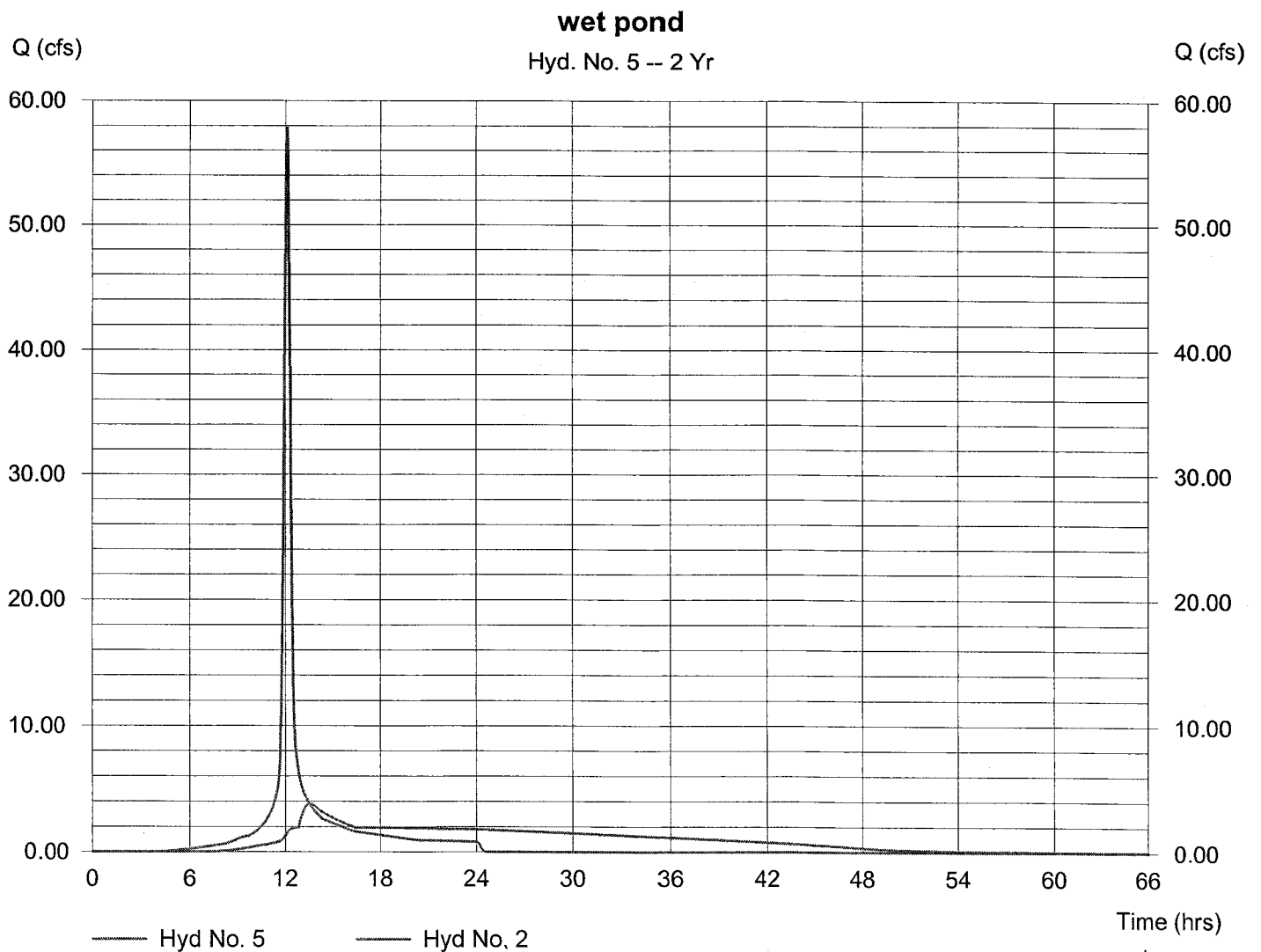
wet pond

Hydrograph type = Reservoir  
Storm frequency = 2 yrs  
Inflow hyd. No. = 2  
Reservoir name = WET POND

Peak discharge = 3.81 cfs  
Time interval = 2 min  
Max. Elevation = 82.02 ft  
Max. Storage = 189,404 cuft

Storage Indication method used. Wet pond routing start elevation = 77.40 ft.

Hydrograph Volume = 202,670 cuft



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	31.96	2	736	145,833	---	----	----	PRE-DEVELOPMENT
2	SCS Runoff	103.74	2	726	377,016	---	----	----	9069POST-DEVELOPMENT
5	Reservoir	62.45	2	738	375,631	2	83.12 no curbs	228,727	wet pond
bmp#1 revised 4_23_05.GPW					Return Period: 10 Year			Wednesday, May 18 2005, 9:08 AM	

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:32 AM

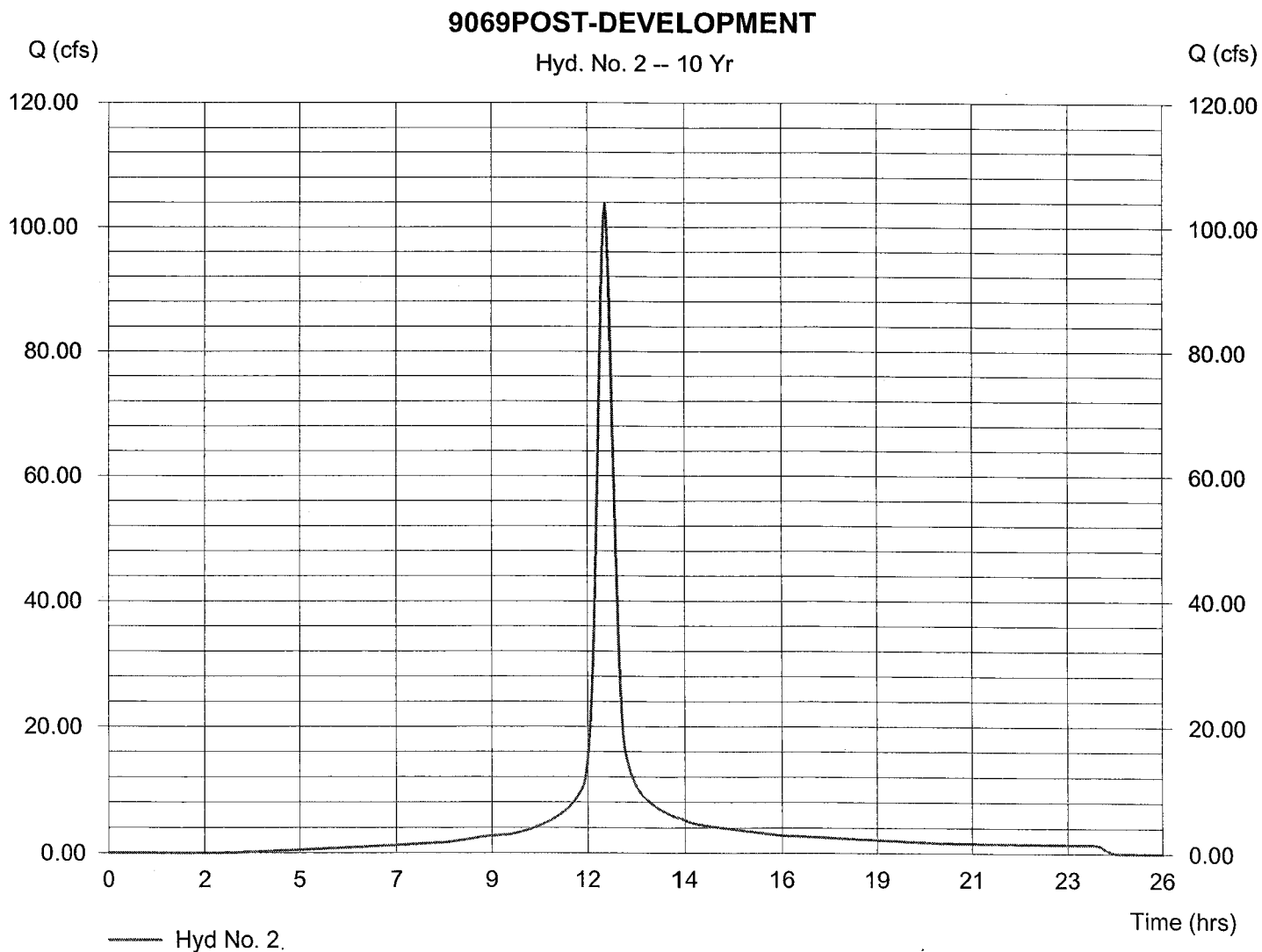
## Hyd. No. 2

### 9069POST-DEVELOPMENT

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 20.94 ac  
Basin Slope = 2.0 %  
Tc method = USER  
Total precip. = 5.80 in  
Storm duration = 24 hrs

Peak discharge = 103.74 cfs  
Time interval = 2 min  
Curve number = 92  
Hydraulic length = 3000 ft  
Time of conc. (Tc) = 21 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 377,016 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:28 AM

## Hyd. No. 5

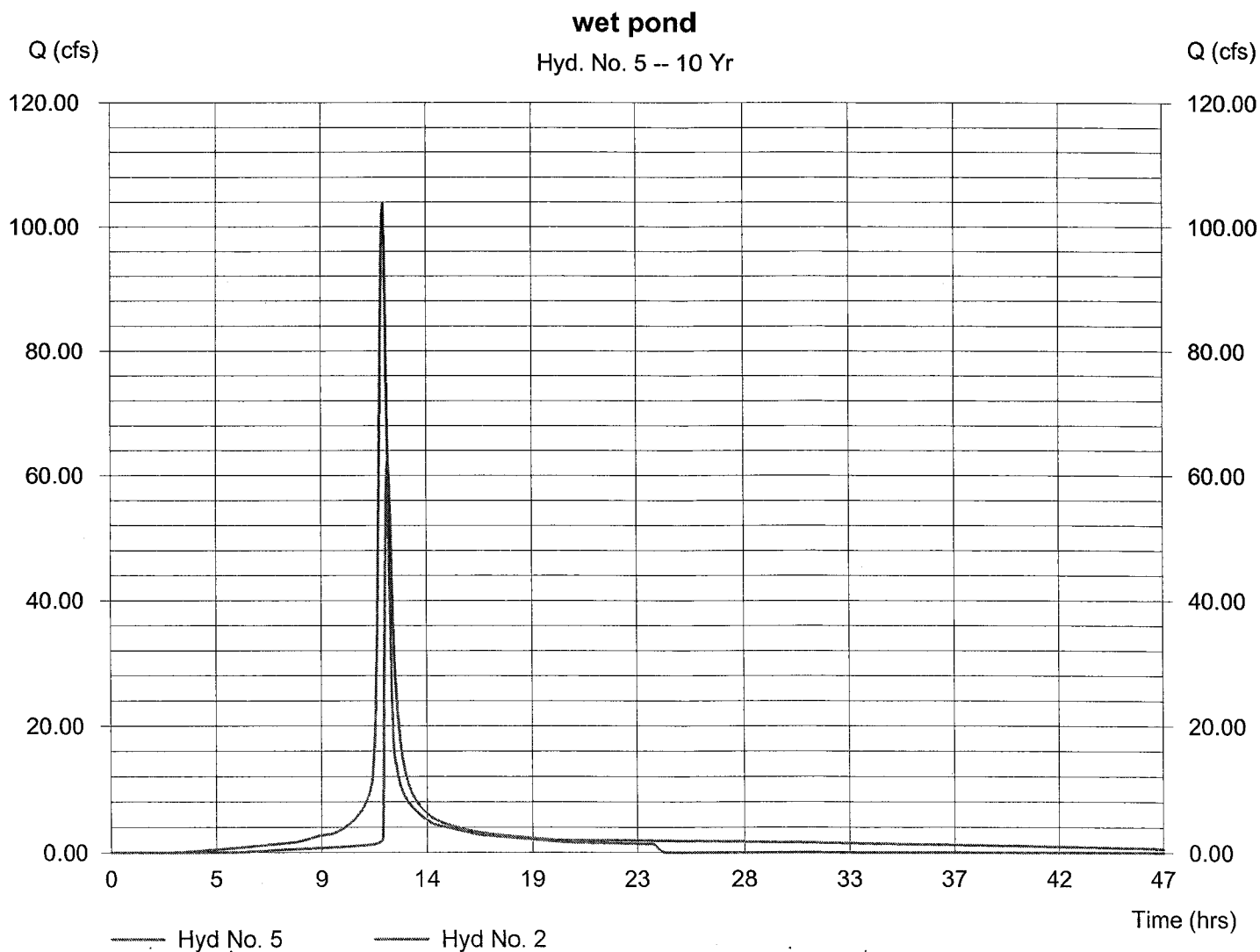
wet pond

Hydrograph type = Reservoir  
Storm frequency = 10 yrs  
Inflow hyd. No. = 2  
Reservoir name = WET POND

Peak discharge = 62.45 cfs  
Time interval = 2 min  
Max. Elevation = 83.12 ft  
Max. Storage = 228,727 cuft

Storage Indication method used. Wet pond routing start elevation = 77.40 ft.

Hydrograph Volume = 375,631 cuft



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	37.56	2	734	170,769	---	----	-----	PRE-DEVELOPMENT
2	SCS Runoff	115.60	2	726	422,677	---	----	-----	9069POST-DEVELOPMENT
5	Reservoir	80.42	2	736	421,283	2	83.31 <i>PREVIOUSLY 83.30</i>	235,601	wet pond
bmp#1 revised 4_23_05.GPW					Return Period: 25 Year			Wednesday, May 18 2005, 9:08 AM	

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:32 AM

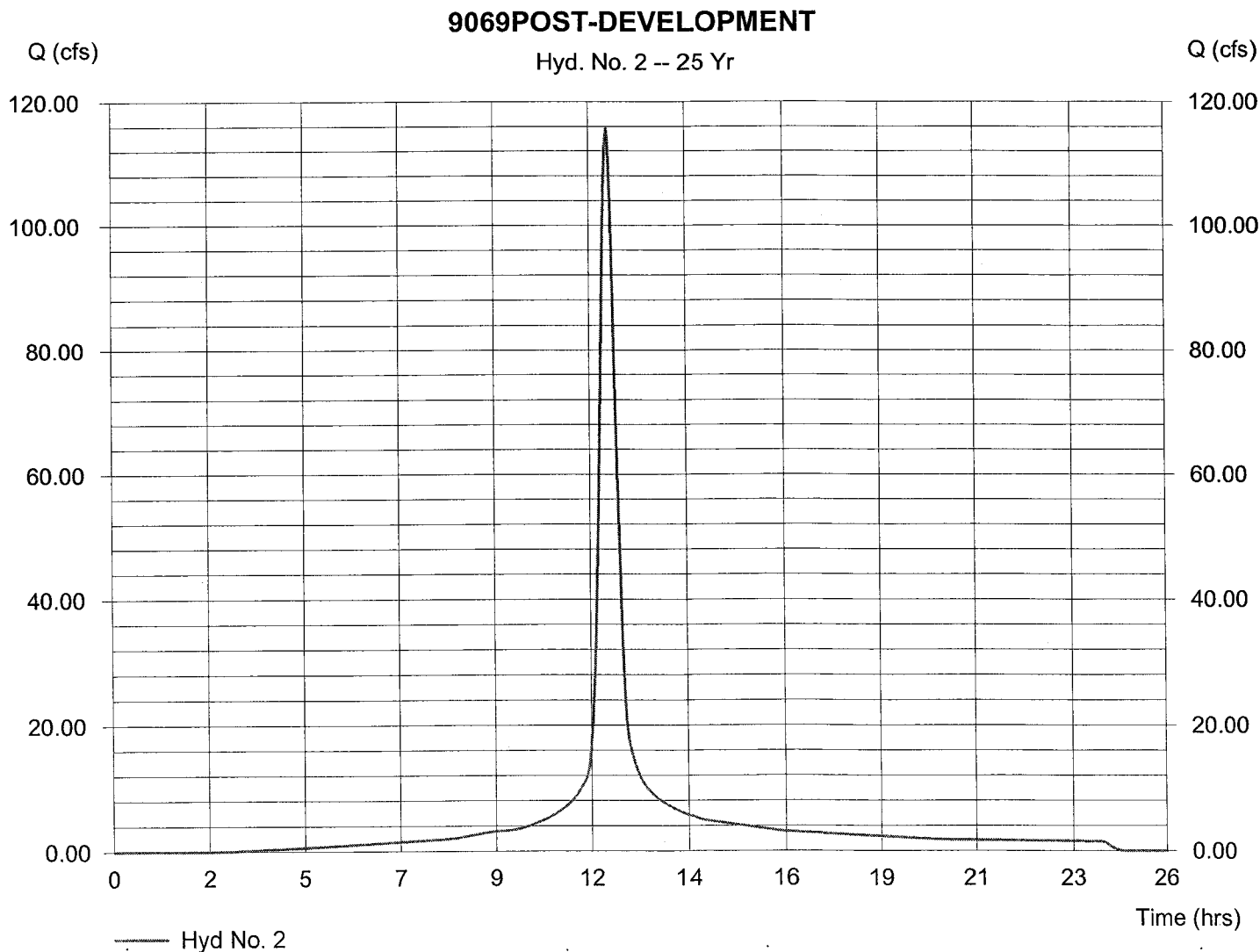
## Hyd. No. 2

### 9069POST-DEVELOPMENT

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 20.94 ac  
Basin Slope = 2.0 %  
Tc method = USER  
Total precip. = 6.40 in  
Storm duration = 24 hrs

Peak discharge = 115.60 cfs  
Time interval = 2 min  
Curve number = 92  
Hydraulic length = 3000 ft  
Time of conc. (Tc) = 21 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 422,677 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:28 AM

## Hyd. No. 5

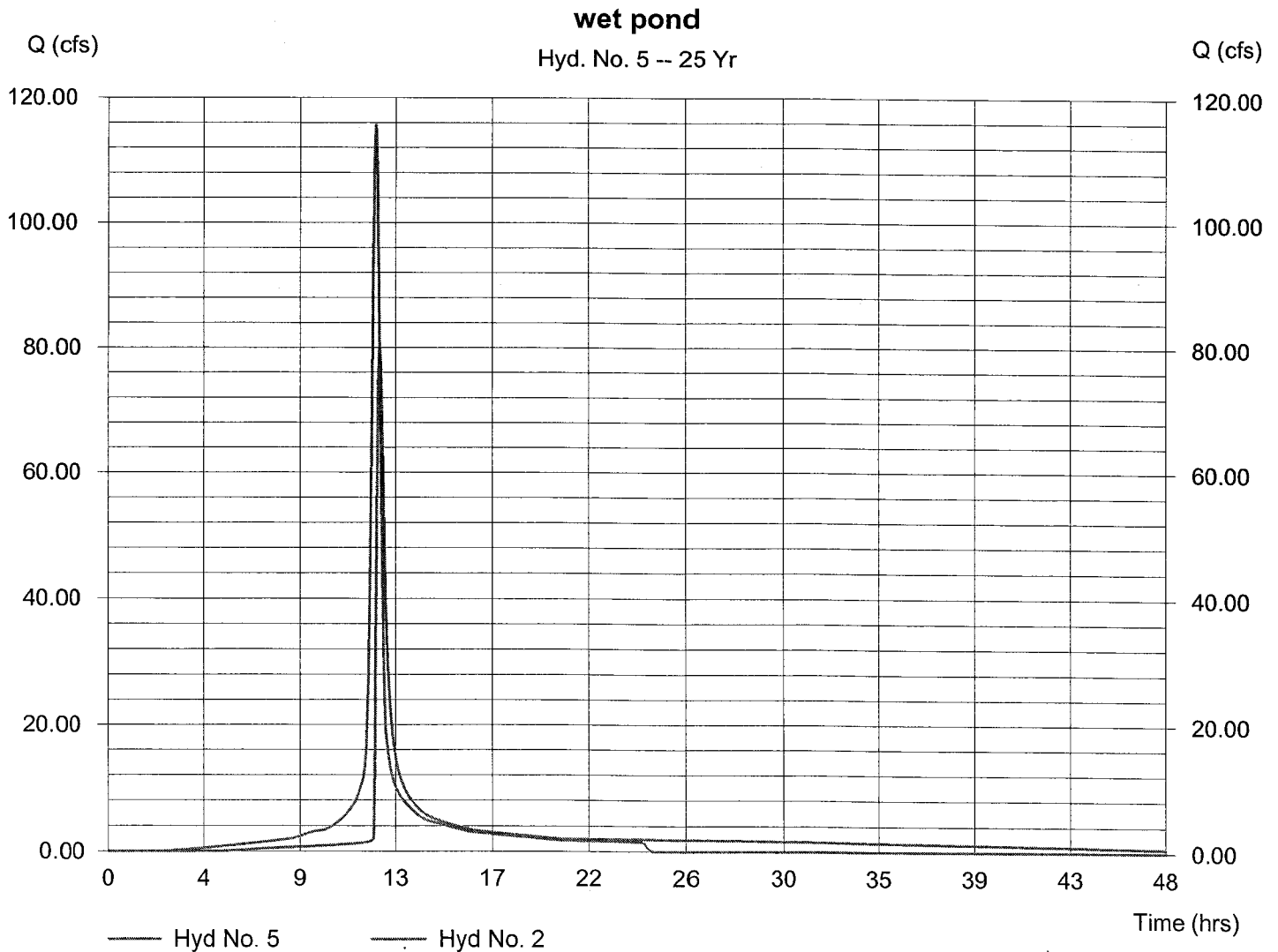
wet pond

Hydrograph type = Reservoir  
Storm frequency = 25 yrs  
Inflow hyd. No. = 2  
Reservoir name = WET POND

Peak discharge = 80.42 cfs  
Time interval = 2 min  
Max. Elevation = 83.31 ft  
Max. Storage = 235,601 cuft

Storage Indication method used. Wet pond routing start elevation = 77.40 ft.

Hydrograph Volume = 421,283 cuft



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	52.98	2	734	239,937	----	-----	-----	PRE-DEVELOPMENT
2	SCS Runoff	147.05	2	726	544,951	----	-----	-----	9069POST-DEVELOPMENT
5	Reservoir	121.09	2	732	543,542	2	83.70	250,592	wet pond
bmp#1 revised 4_23_05.GPW					Return Period: 100 Year		Wednesday, May 18 2005, 9:08 AM		



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:32 AM

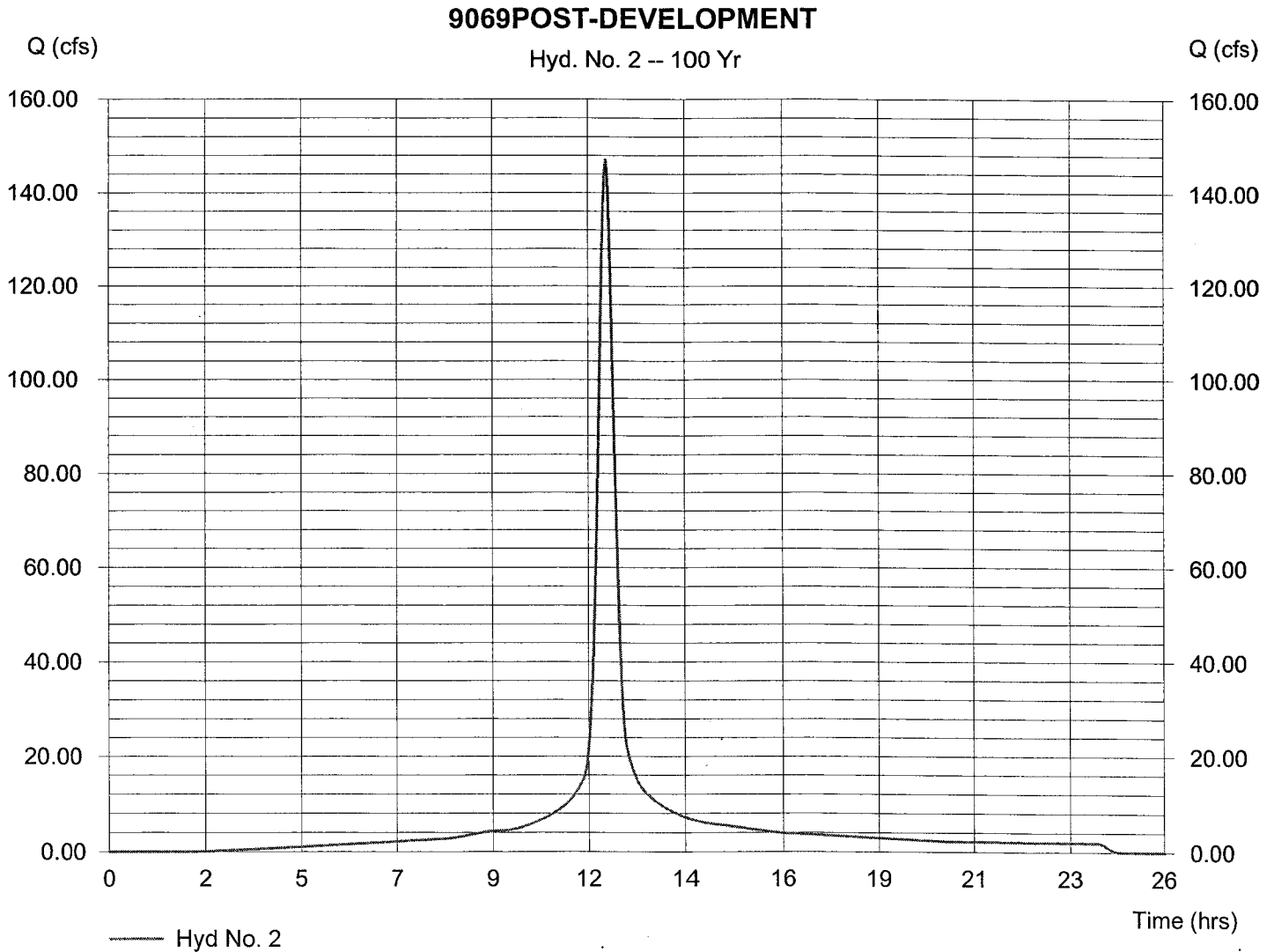
## Hyd. No. 2

### 9069POST-DEVELOPMENT

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 20.94 ac  
Basin Slope = 2.0 %  
Tc method = USER  
Total precip. = 8.00 in  
Storm duration = 24 hrs

Peak discharge = 147.05 cfs  
Time interval = 2 min  
Curve number = 92  
Hydraulic length = 3000 ft  
Time of conc. (Tc) = 21 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 544,951 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, May 18 2005, 9:28 AM

## Hyd. No. 5

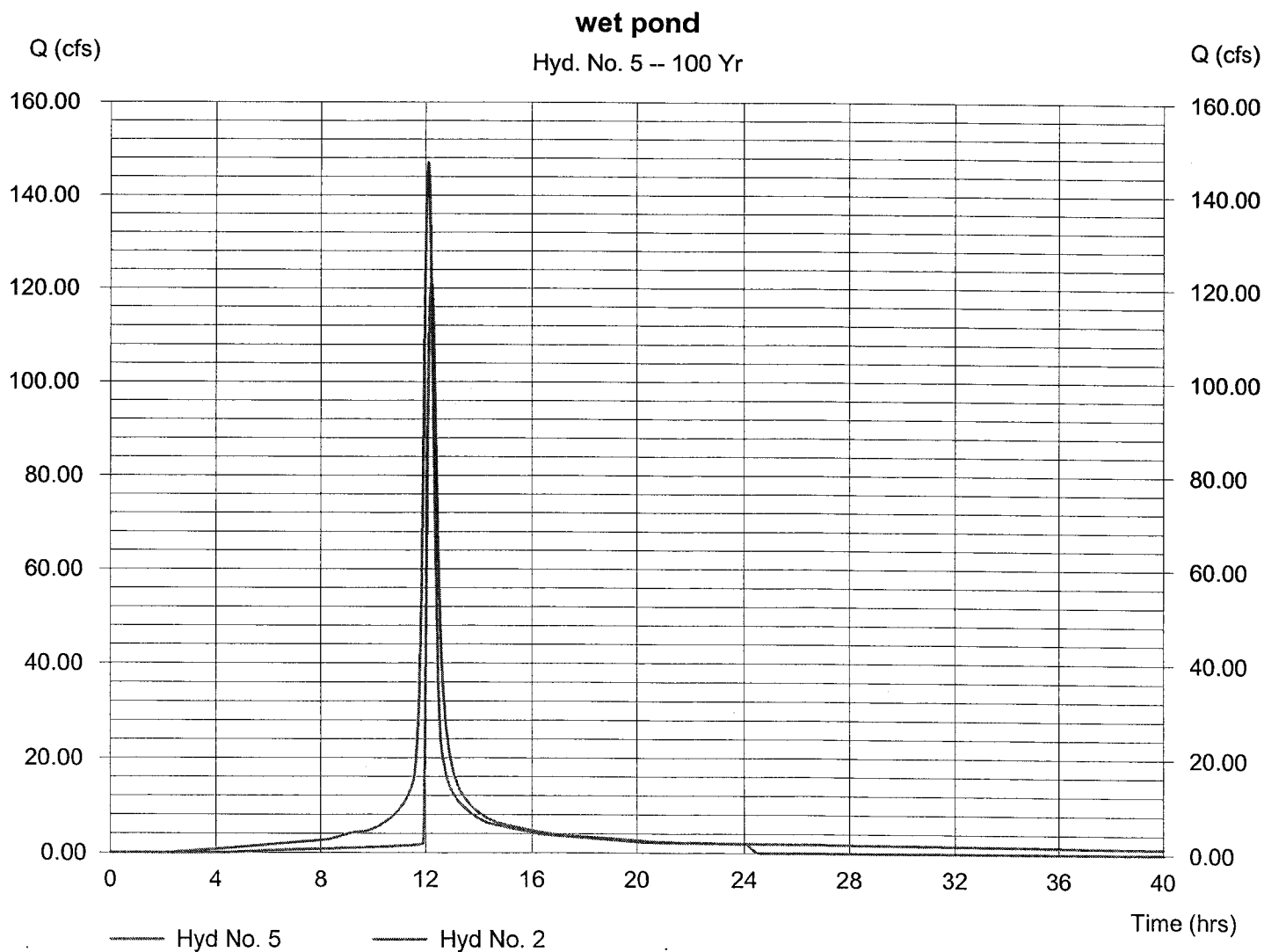
wet pond

Hydrograph type = Reservoir  
Storm frequency = 100 yrs  
Inflow hyd. No. = 2  
Reservoir name = WET POND

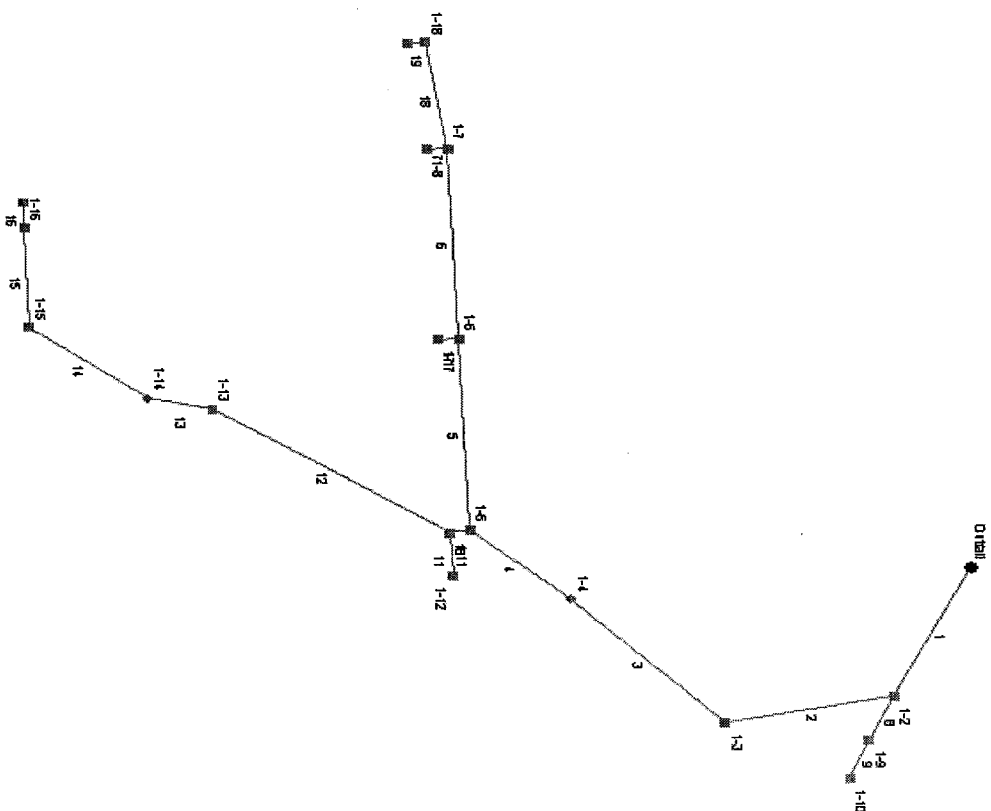
Peak discharge = 121.09 cfs  
Time interval = 2 min  
Max. Elevation = 83.70 ft  
Max. Storage = 250,592 cuft

Storage Indication method used. Wet pond routing start elevation = 77.40 ft.

Hydrograph Volume = 543,542 cuft



## Hydraflow Plan View



Project file: stormsystem#1 rev 4\_25\_05.stm

No. Lines: 19

05-18-2005

# Storm Sewer Tabulation

Station	Len	Drng Area		Rnof coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rlm Elev		Line ID
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
Line	To Line	(ft)	(ac)	(ac)	(C)		(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	192.0	1.11	16.53	0.90	1.00	14.75	5.0	21.5	4.3	64.08	106.2	5.10	0.55	77.15	76.10	83.50	83.12	86.50	0.00	1-1 to 1-2
2	1	203.0	0.66	13.17	0.90	0.59	11.73	12.0	20.7	4.4	51.91	104.8	4.13	0.53	78.23	77.15	84.25	83.99	89.30	86.50	1-2 to 1-3
3	2	243.0	0.00	12.51	0.90	0.00	11.14	0.0	19.7	4.5	50.46	101.8	4.02	0.50	79.45	78.23	84.83	84.53	91.00	89.30	1-3 to 1-4
4	3	149.0	1.63	12.51	0.90	1.47	11.14	17.0	19.1	4.6	51.20	101.9	4.07	0.50	80.20	79.45	85.06	84.87	88.29	91.00	1-4 to 1-5
5	4	252.0	1.25	6.45	0.90	1.13	5.68	5.0	7.8	6.3	35.95	47.16	5.09	0.50	81.46	80.20	86.07	85.34	87.80	88.29	1-5 to 1-6
6	5	252.0	1.14	3.24	0.90	1.03	2.79	5.0	6.2	6.7	18.67	47.16	2.64	0.50	82.72	81.46	86.88	86.68	87.80	87.80	1-6 to 1-7
7	6	24.0	1.48	1.48	0.90	1.33	1.33	5.0	5.0	7.0	9.32	38.63	2.97	2.92	83.42	82.72	87.08	87.04	88.10	87.80	1-7 to 1-8
8	1	64.0	1.80	2.25	0.90	1.62	2.03	10.0	10.0	5.9	11.93	38.45	3.80	2.89	79.00	77.15	84.17	83.99	85.50	86.50	1-9 to 1-2
9	8	56.0	0.45	0.45	0.90	0.41	0.41	8.0	8.0	6.3	2.55	8.63	2.08	1.79	80.00	79.00	84.37	84.28	86.33	85.50	1-10 to 1-9
10	4	24.0	1.25	4.43	0.90	1.13	3.99	19.0	19.0	4.6	18.36	40.51	5.85	3.21	80.97	80.20	85.50	85.34	88.29	88.29	1-11 to 1-5
11	10	58.0	0.61	0.61	0.90	0.55	0.55	18.0	18.0	4.7	2.59	13.22	2.11	4.19	83.40	80.97	86.23	86.14	89.70	88.29	1-12 to 1-11
12	10	321.0	0.19	2.57	0.90	0.17	2.31	5.0	7.1	6.5	14.99	15.77	4.77	0.49	82.53	80.97	87.55	86.14	91.53	88.29	1-13 to 1-11
13	12	77.0	0.00	2.38	0.90	0.00	2.14	0.0	6.8	6.5	14.02	15.89	4.46	0.49	82.91	82.53	88.09	87.80	93.50	91.53	1-14 to 1-13
14	13	170.0	1.05	2.38	0.90	0.94	2.14	5.0	6.2	6.7	14.33	15.71	4.56	0.48	83.73	82.91	88.91	88.23	90.75	93.50	1-15 to 1-14
15	14	132.0	0.57	1.33	0.90	0.51	1.20	5.0	5.4	6.9	8.26	15.63	2.63	0.48	84.36	83.73	89.45	89.27	89.60	90.75	1-16 to 1-15
16	15	34.0	0.76	0.76	0.90	0.68	0.68	5.0	5.0	7.0	4.78	14.51	1.52	0.41	84.50	84.36	89.52	89.50	89.60	89.60	1-16A to 1-16
17	5	24.0	1.96	1.96	0.90	1.76	1.76	5.0	5.0	7.0	12.34	39.18	3.93	3.00	82.18	81.46	86.75	86.68	87.80	87.80	1-17 to 1-6
18	6	142.0	0.26	0.62	0.70	0.18	0.43	5.0	5.3	6.9	3.01	8.18	2.45	1.61	85.00	82.72	87.35	87.04	89.00	87.80	1-18 to 1-7
19	18	22.0	0.36	0.36	0.70	0.25	0.25	5.0	5.0	7.0	1.76	7.54	1.44	1.36	85.30	85.00	87.50	87.49	89.00	89.00	1-19 to 1-18

Project File: stormsystem#1 rev 4\_25\_05.sim

Number of lines: 19

Run Date: 05-18-2005

NOTES: Intensity = 140.36 / (Inlet time + 19.80) ^ 0.93; Return period = 10 Yrs.



# S.L. NUSBAUM Realty Co.

9211 Forest Hill Avenue, Suite 110 • Richmond, Virginia 23235 • (804) 320-7600 • FAX (804) 330-8924

**Via Hand Delivery**

July 26, 2004

Scott J. Thomas, P.E.  
Senior Engineer  
Environmental Division  
James City County  
101-E Mounts Bay Road  
Williamsburg, VA 23187

SP-150-03

Re: Report of Subsurface Exploration and Geotechnical Engineering Analysis  
WindsorMeade Marketplace BMP

Dear Scott:

Pursuant to your request, please find enclosed a copy of the referenced report from ECS, Ltd. dated July 20, 2004. Per your comments on the engineered site plan for the project, you requested a geotechnical study be performed on the BMP. Accordingly, the enclosed analysis should satisfy this site plan requirement.

If you have any questions or comments regarding the above, please feel free to contact me.

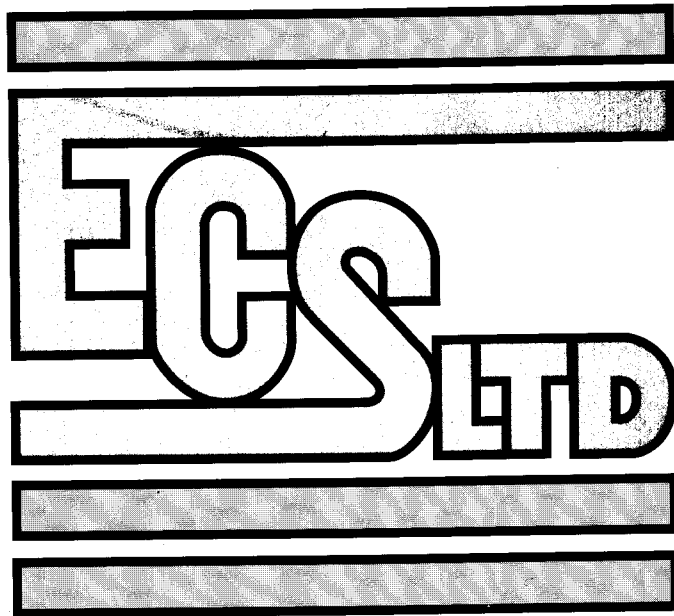
Sincerely,

James M. Gresock  
Senior Vice President - Development

JMG:lds

Enclosure - as noted

cc Arch Marston/AES Consulting Engineers



**REPORT OF**  
**SUBSURFACE EXPLORATION**  
**AND GEOTECHNICAL ENGINEERING ANALYSIS**

**WINDSORMEADE MARKETPLACE BMP**  
**JAMES CITY COUNTY, VIRGINIA**

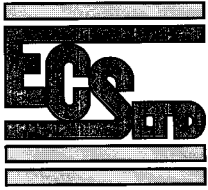
**FOR**

**Mr. James Gresock**

**July 20, 2004**

**ECS Project No. 07:6958**

*SP-150-03*  
*Recommend liner to*  
*achieve wet pond*  
*seepage losses.*



ENGINEERING CONSULTING SERVICES, LTD.  
Geotechnical \* Construction Materials \* Environmental

July 20, 2004

Mr. James M. Gresock  
S.L. Nusbaum Realty Company  
9211 Forest Hill Avenue  
Suite 110  
Richmond, Virginia 23235

ECS Project No. 07:6958

Reference: Subsurface Exploration and Geotechnical Engineering Analysis  
Proposed Windsormeade Marketplace BMP  
Monticello Avenue  
James City County, Virginia

Dear Mr. Gresock,

Engineering Consulting Services, Ltd. has completed a subsurface exploration and engineering evaluation of the above referenced project. This report presents the results of the subsurface exploration and engineering analyses including SWM pond design recommendations. We were provided with a copy of a plan from AES Consulting Engineers illustrating the proposed pond and dam area with proposed and existing topographic lines (elevations).

**Introduction:**

The project site is located within the proposed Windsormeade Marketplace in James City County, Virginia. At the time of our site reconnaissance, the site was wooded with heavy undergrowth.

The proposed project will consist of a new BMP (wet pond) and earth dam. The purpose of this exploration was to explore the soil and groundwater conditions at the site and to develop soils-related engineering recommendations to guide design and construction of the planned BMP facility. Our investigation included drilling three (3) soil borings to explore the subsurface soil and groundwater conditions, performing a site reconnaissance to observe general topography, and analyzing field data to develop appropriate geotechnical engineering recommendations regarding the BMP facility construction. A Boring Location Plan is included in Appendix I.

108 Ingram Road, Unit 1 • Williamsburg, Virginia 23188 • (757) 229-6677 • Fax (757) 229-9978

Offices: Richmond, VA • Chesapeake, VA • Washington, D.C. • Williamsburg, VA • Roanoke, VA • Fredericksburg, VA • Danville, VA • Winchester, VA  
Aberdeen, MD • Baltimore, MD • Frederick, MD • Research Triangle Park, NC • Wilmington, NC • Charlotte, NC • Greensboro, NC • Greenville, SC • Atlanta, GA

### **Field Exploration Procedures:**

Three soil test borings were performed in the proposed BMP location to depths of 15 to 20 feet below existing ground surface. The soil test boring was performed with an ATV drill rig utilizing continuous flight, hollow stem augers to advance the borehole. Drilling slurry fluid was not used in this process.

Representative soil samples were obtained by means of the split-barrel sampling procedure in accordance with ASTM Specification D-1586. In this procedure, a 2-inch outside diameter split-barrel sampler is driven into the soil a distance of 24 inches by a 140-pound hammer falling 30 inches. After a 6-inch seating interval, the number of blows required to drive the sampler through the next 12-inch interval is termed the Standard Penetration Test (SPT) value and is indicated for each sample on the boring log. This value can be used as a qualitative indication of the in-place relative density and relative consistency of non-cohesive soils and cohesive soils, respectively. This indication is qualitative, since many factors can significantly affect the standard penetration resistance value and prevent a direct correlation between drill crews, drill rigs, drilling procedures, and hammer-rod-sampler assemblies.

Field logs of the soils encountered in the borings were maintained by the drill crew. After recovery, each sample was removed from the sampler and visually classified. Representative portions of each sample were sealed in glass jars and delivered to our laboratory in Williamsburg, Virginia, for further visual examination and laboratory testing.

### **Subsurface Conditions:**

Experienced personnel from our office classified each soil sample in accordance with the Unified Soil Classification System (USCS) and/or the United States Department of Agriculture (USDA) textural classification system, as applicable. Select samples from the test borings were subjected to classification testing to confirm our visual classifications. The group symbols for each soil type are indicated in parentheses following the soil descriptions on the boring logs. The geotechnical engineer grouped the various soil types into the major zones noted on the boring logs. The stratification lines designating the interfaces between earth materials on the boring logs are approximate; in situ, the transitions may be gradual. A brief explanation of the USCS and a Reference Notes for Boring Log sheet is provided in Appendix IV of this report.

Our subsurface exploration and site reconnaissance determined that the surface of the site is generally covered with about 5 to 7 inches of topsoil. Underlying the surficial topsoil, subsurface soils were generally comprised of interbedded deposits of very loose to medium dense Silty and Clayey SAND (SM, SC), and soft to very stiff Sandy CLAYS (CL). The Standard Penetration Test (SPT) N-values recorded within these layers ranged from 2 to 22 blows-per-foot (bpf). Existing ground surface elevations ranged from 72 feet to 90 feet above mean sea level (msl) in the project area.



Groundwater was encountered at each boring location at approximately 6 to 18 feet bgs. Please note that groundwater levels are influenced by seasonal conditions and by periods of significant precipitation or prolonged drought. Due to the clay layers encountered, we expect that areas of perched groundwater will be encountered. Due to the depth of groundwater, it appears that it will be encountered during the proposed pond construction and will likely require groundwater control methods such as well pointing during construction.

### **Subgrade Preparation and Earthwork Operations:**

The average depth of topsoil recorded in the test borings was about 5 to 7 inches. Stripping of wooded areas typically disturbs the soils to a greater depth due to the presence of root mat which often extends below the bottom of the topsoil. Therefore, for project planning purposes, we recommend a 8-inch stripping depth for this site to remove topsoil and associated organic matter. Isolated areas may require further cuts of an additional 12 inches or more due to tree stumps and heavy root mat from closely spaced trees, etc. The stripping depth should be evaluated at the time of construction by representatives of the Geotechnical Engineer. If the undercuts extend into large areas, the undercut volume could be reduced by the use of geotextiles or geogrids. The use of geosynthetic reinforcement should be evaluated by the geotechnical engineer at the time of construction. Cut and fill operations should extend a minimum of 5 feet beyond the project limits.

After stripping or cutting to the desired grade, and prior to fill placement, subgrades should be observed by the Geotechnical Engineer. Some of the soil subgrades had natural moisture contents which were above the soils' plastic limit. Therefore, soft soil conditions are anticipated after stripping and the contractor may be required to scarify, aerate and re-compact these soils prior to additional fill placement.

Any soft or unsuitable materials encountered, which cannot be stabilized by reworking the soil as discussed above, should be removed and replaced with an approved structural fill. Undercut volumes should be determined by cross-sectioning the area before and after undercut. We have found that calculating undercut volumes by truck counts is less accurate and generally results in additional expense to the owner. In order to minimize undercutting we recommend earthwork operations be performed during the drier times of the year.

We recommend the contract documents include an allowance for undercutting and/or reworking soft near surface soils (if encountered) and replacement with engineered fill. Add/deduct unit prices should also be established so adjustment for the actual volume of undercut can be made.

The Clayey and Silty Sands on the site may be excavated and re-used as structural fill. These soils may be used as fill on the site if they are properly prepared prior to placement. However, significant drying times may be required before the materials could be re-used as compacted fill. Hence these soils may be difficult to reuse without some form of moisture control. All proposed select fill soils for the BMP facility should be submitted to the geotechnical engineer for approval prior to their use on the project. If a fast track schedule is proposed which will not allow

appropriate drying times for wetter soils, imported fill material will be required to supplement some of these more wet soils.

We recommend imported engineered fill (select) material consisting of approved inorganic material classified as CL, SM, SM-SP, SP, SC or better containing less than about 70% by weight Silt or Clay and free of debris. This material should be placed in horizontal lifts not exceeding 8 inches in loose thickness, moisture conditioned to within +/- 3% of the optimum moisture content, and compacted to a minimum of 95% of the maximum dry density obtained in accordance with VTM-1, Standard Proctor method. Select fill slopes should be no greater than 3 horizontal to 1 vertical.

#### **Earthen Embankments and Slope Stability:**

Based on the provided plan, we understand that an existing low lying area is planned to be utilized as a stormwater management facility for the development. This storm water management pond will require an earth berm about 10 feet high. Based on the planned construction, we recommend an 8-foot wide key trench be constructed to a minimum depth of about 4 feet below the stripped subgrades. The key trench may extend deeper if the underlying soils are not considered suitable for support of the fill at the time of construction. The subgrades should be stripped of all organics and soft soils and be observed by the geotechnical engineer prior to the placement of compacted structural fill.

Two soil test borings were performed in the proposed SWM earthen dam area. The borings were drilled to a depth of about 20 feet below site grades. The soils located within the pond area consisted of predominately Silty and Clayey Sand (SM, SC) with some interbedded Sandy Clay. Only the CLAY soils are considered suitable for reuse as the dam core material. It is not anticipated that materials on site will provide enough materials for the dam core, so additional off-site material will be required to complete the core. Clay core material should classify as Sandy Clay (CL or CH) material. This material should be placed in horizontal lifts not exceeding 8 inches in loose thickness, moisture conditioned to within +/-3% of the optimum moisture content, and compacted to a minimum 95% of the maximum dry density obtained in accordance with ASTM Specification D-698, Standard Proctor method. Slopes should be constructed no greater than 3 horizontal to 1 vertical. Also, the side slopes should be seeded to promote vegetation growth and further add to the stability of the slopes.

## **Infiltration**

We understand the pond area may have up to a 7 ft cut. The sandy soils, at this elevation, are anticipated to have fairly high permeability and classify as Hydrologic Soil Group designation B (infiltration rates of about 0.52 to 1.0 inch/hour). The miscellaneous clay soils encountered will have Hydrologic Soil Group designations of C and D. Typically, soil with the Hydrologic Soil Group designations of A and B are considered to be suitable for Best Management Practices (BMP) that may utilize on-site filtration in their designs. Some soils designated as C type soils are considered suitable for infiltration practices but these soils would need to be evaluated on a case specific basis. Soils with group designations of D are generally not considered suitable for infiltration practices.

It is anticipated that this pond is being designed as wet pond with a planned permanent pool elevation. Due to the permeability rates of these soils, it is anticipated that the water level in the pond will fluctuate as the seasonal groundwater elevation fluctuates and during periods of wet or dry weather. Seepage losses could occur through the pond bottom or side slopes. If it is planned to maintain a permanent pool elevation, construction measures to minimize seepage losses will be necessary. Modification to the side slopes and pond bottom may be necessary in the form of a liner system.

In order to reduce seepage losses through the permeable soils, a liner consisting of lower permeability material may need to be placed on the sand side slopes and pond bottom. We considered three options to line the pond. The method selected should be based on a combination of cost and simplicity of construction. The following are not listed in any particular order of preference:

- **Compacted Clay Soil Liner** - A minimum layer of 12 inches of moderately to highly plastic Clay soils should be placed on the slopes. Prior to the placement of this layer, all topsoil and organics should be removed to suitable natural or compacted fill soils. The on-site clay soils at the project site would be considered suitable for pond liner material. Soils should classify as CL and CH material and should conform to the following specifications: Permeability less than  $1 \times 10^{-6}$  cm/sec, Plasticity Index not less than 15, Liquid Limit not less than 30, and clay particles not less than 30 percent. These materials should be suitable when compacted with a sheepsfoot compactor at a moisture content slightly above optimum moisture content to at least 95 percent of the Standard Proctor maximum dry density (ASTM D698). We also recommend a 12 inch layer of a suitable protective surface cover be placed on the clay soil liner to act as a buffer during dry months where the soils will tend to desiccate.
- **Geocomposite Clay Liner (GCL)** - After excavation of about 6 inches of the existing topsoil, a GCL such as CETCO Bentomat ST may be placed on the slope. The GCL must be placed in an anchor trench at the top of the slope and then covered with a 12 inch layer of soil. This layer of protective soil could be any type of on-site soil as long as suitable compaction, as referenced above, could be attained.

- Geomembrane Liner - Pond liners are available in a number of materials such as PVC, polypropylene, HDPE, VLDPE and LLDPE. Installation is similar to the GCL in the use of an anchor trench and soil cover. There are materials which can be left exposed, but this might be an aesthetic problem or could be a safety issue as the material could be quite slick. To keep a soil cover from sliding off a smooth plastic liner, a textured liner should be considered. The thinnest textured liners appear to be about 30 mils (such as OxyGrip 30 mil Textured PVC by Occidental Chemical Corp. or Solmax 630T textured VFPE-LDPE by Solmax International). The selection of an appropriate material should be made after discussions with local suppliers to see which materials are readily available at a reasonable cost.

If a liner is planned for the pond the groundwater elevation will need to be lowered to a minimum of 2 feet below the proposed bottom of pond elevation prior to liner placement. Additionally, the water level in the pond, once the liner is placed, should be sufficient to prevent heaving of the liner once the groundwater elevation is allowed to return to its normal seasonal elevation. This can be achieved by re-directing water flow from the well-pointing operation back into the pond excavation once the liner is in place.

#### **Construction Considerations:**

The side slopes of the proposed pond must be properly prepared. All topsoil and organics should be removed to suitable natural soils. Most of the soils as mentioned above are considered suitable for slopes of 3H:1V or more. The slopes should be constructed utilizing engineered fill placed in controlled, horizontal, and compacted lifts that are benched into any existing slopes. On-site sandy or clayey soils are considered suitable for engineered fill to regrade the slopes. This material should be placed in horizontal lifts not exceeding 8 inches in loose thickness, moisture conditioned to within  $\pm 3\%$  of the optimum moisture content, and compacted to a minimum 95% of the maximum dry density obtained in accordance with ASTM Specification D-698, Standard Proctor method. Slopes should be constructed no greater than 3H:1V. Also, the side slopes should be seeded to promote vegetation growth and further add to the stability of the slopes and help to reduce surface sloughing failures.

The subgrade materials are moisture sensitive, and exposure to the environment may weaken the soils at the subgrade level if the excavations remain open for too long a time. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed and replaced by suitable select fill material.

In a dry, re-worked, and compacted state, the soil at the site will provide good subgrade support for fill placement and construction operations; however, when wet, this soil will degrade quickly with disturbance from contractor operations. Good site drainage should be maintained during earthwork operations which would help maintain the integrity of the soil.

Proper compaction control of fill is an important aspect of this project. Therefore, we recommend that all fill operations be observed full-time by a qualified soil technician to determine if minimum compaction requirements are being met.

**General Comments:**

This report has been prepared in order to aid in the evaluation of this site and to assist the Contractor, Architect and Engineer in the design and planning of the project. The report scope is limited to the specific project and location described, and the project description represents our understanding of the significant aspects relevant to soil and foundation characteristics.

We have appreciated being of service to you during the design phase of this project and look forward to its successful construction. If you should have any questions regarding the information and recommendations contained in this report or if we can be of any further assistance, please contact our office.

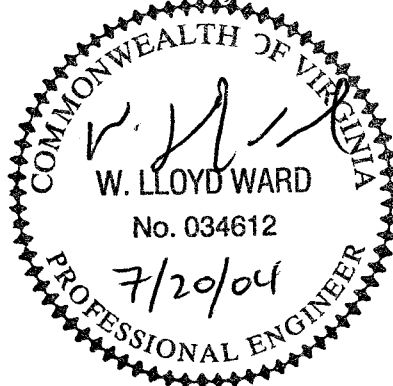
Respectfully,

ENGINEERING CONSULTING SERVICES, LTD.



David Gordinier, E.I.T.  
Project Engineer

DJG/WLW:kks

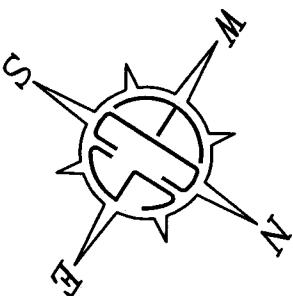
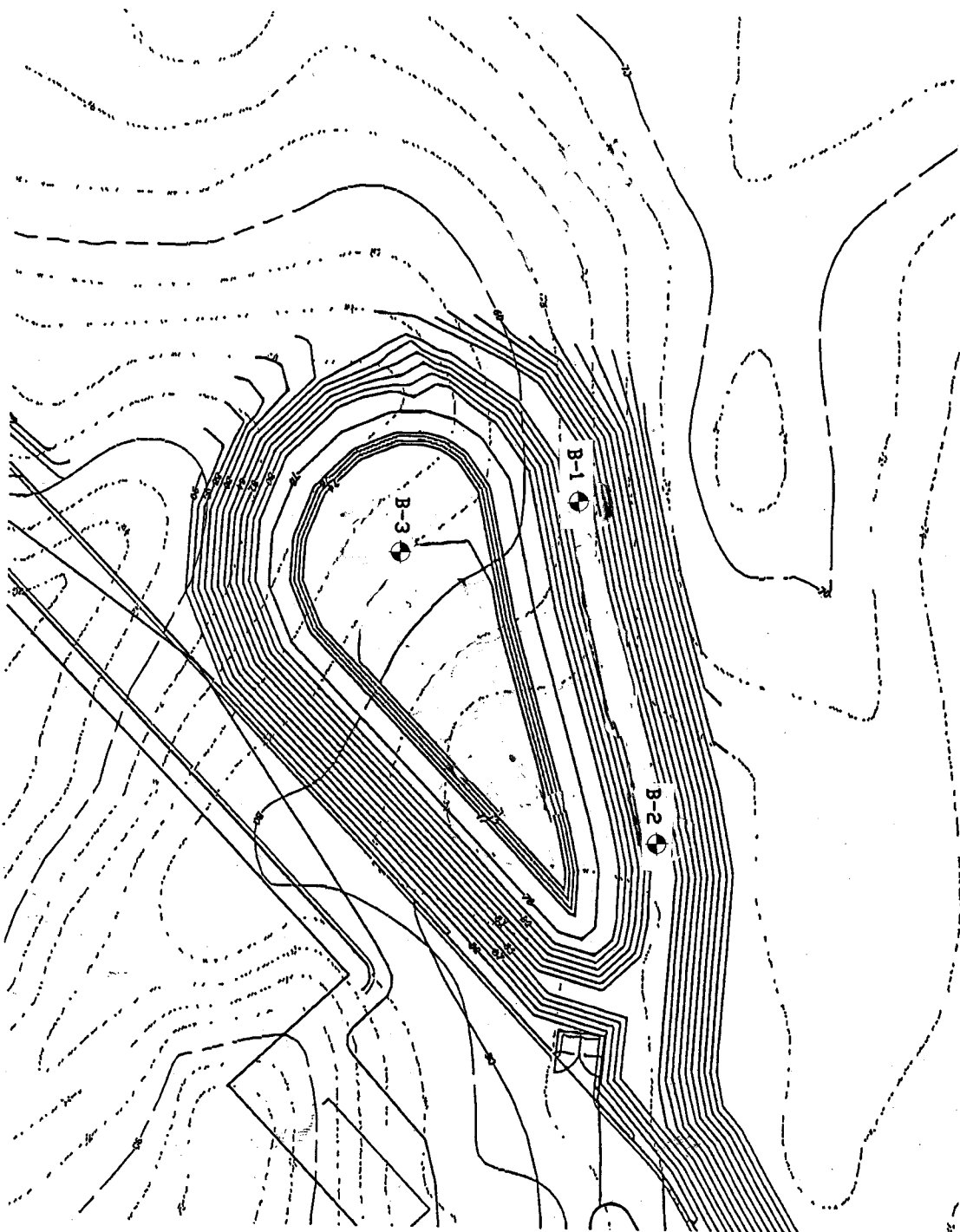


W. Lloyd Ward, P.E.  
Senior Engineer

- Appendix:
- I. Boring Location Diagram (1)
  - II. Soil Test Boring Logs (3)
  - III. Laboratory Test Summary and Results (1)
  - IV. Unified Soil Classification System/Reference Notes for Boring Logs (2)

*I:\Projects\2004 Projects\Geotechnical\6958 Windsormeade Marketplace BMP\Report\6958 Windsormeade BMP Geo.doc*

## APPENDIX I



## LEGEND:

⊕ - APPROXIMATE BORING LOCATION

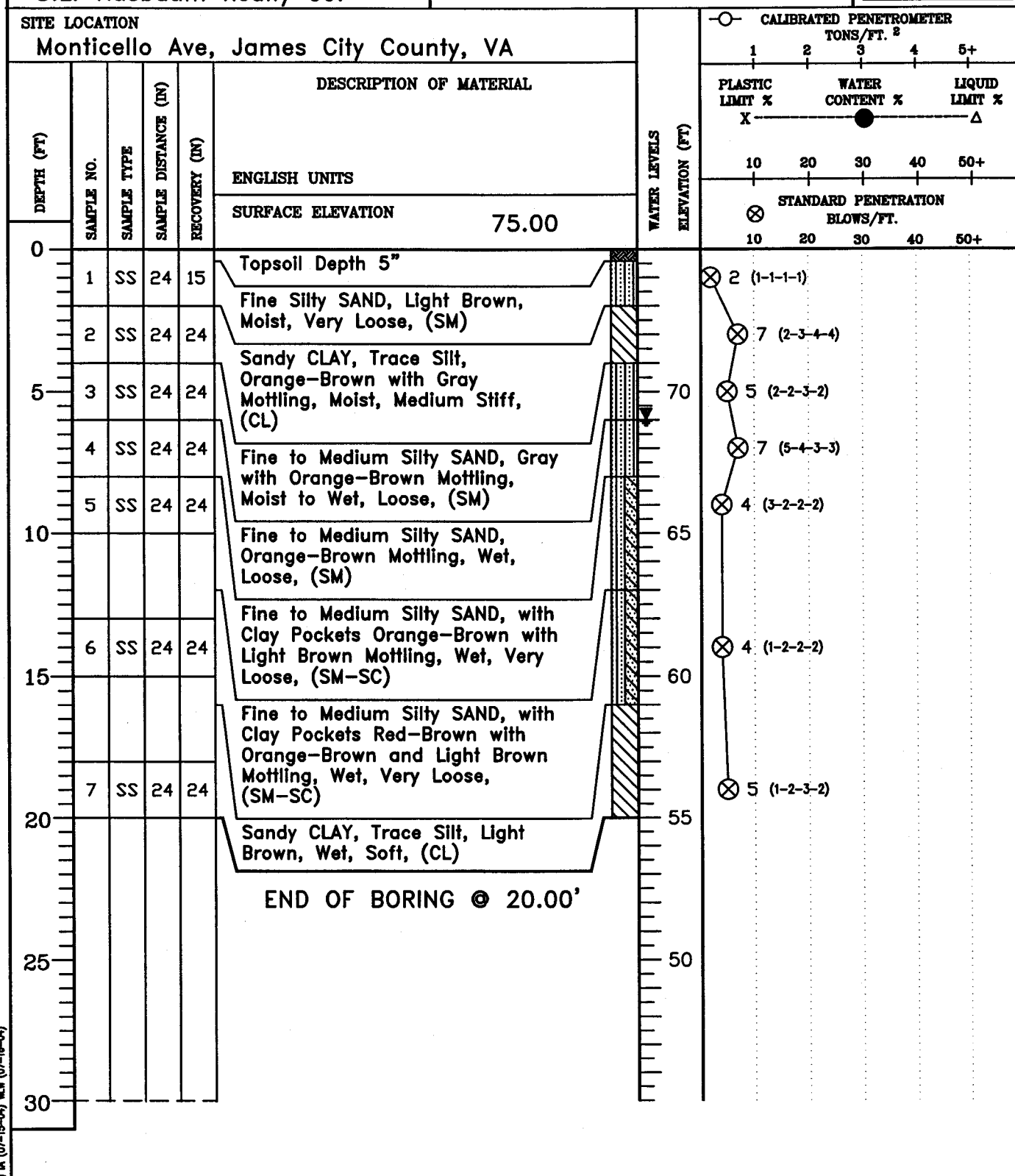
REVISIONS				
<b>ECS LTD</b> <b>ENGINEERING CONSULTING SERVICES LTD</b>				
<b>BORING LOCATION DIAGRAM</b> <b>Windormeade Marketplace BMP</b>				
<b>S.L. Nusbaum Realty Co.</b>				
DWG	DWG	6/23/04	1"=80'	0056
				1 of 1

## APPENDIX II



K.O. (03-11-04) IA (07-15-04) IA (07-15-04) WLW (07-16-04) WLW (07-16-04) WLW (07-16-04) DLG (07-22-04)

CLIENT WindsorMeade Marketplace BMP	JOB # 6958	BORING # B-2	SHEET 1 OF 1	<b>ECS</b> LTD
PROJECT NAME S.L. Nusbaum Realty Co.	ARCHITECT-ENGINEER			



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

K.O. (03-11-04) IA (07-15-04) IA (07-15-04) M.W. (07-18-04)

WL 6	WS OR (D)	BORING STARTED 7/2/04	
WL(AB) 6	WL(AC)	BORING COMPLETED 7/2/04	CAVE IN DEPTH ● 8
WL		RIG ATV FOREMAN	DRILLING METHOD HSA

CLIENT WindsorMeade Marketplace BMP				JOB # 6958	BORING # B-3	SHEET 1 OF 1	
PROJECT NAME S.L. Nusbaum Realty Co.				ARCHITECT-ENGINEER			

SITE LOCATION Monticello Ave, James City County, VA						
DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)		DESCRIPTION OF MATERIAL
						ENGLISH UNITS
						SURFACE ELEVATION 82.00
0	1	SS	24	22	Topsoil Depth 5"	
	2	SS	24	19	Fine Silty SAND, Light Brown, Moist, Very Loose, (SM)	
5	3	SS	24	24	Sandy CLAY, With Silt, Brown to Orange-Brown with Red-Brown Mottling, Moist, Medium Stiff to Very Stiff, (CL)	
	4	SS	24	23		
10	5	SS	24	20	Fine to Medium Silty SAND, Yellow-Brown, Moist, Loose, (SM)	
					Sandy CLAY, Red-Brown, Moist to Wet, Medium Stiff, (CH)	
15	6	SS	18	18	Fine to Medium Silty SAND, With Clay Pockets, Orange-Brown with Red-Brown Mottling, Wet, Loose, (SC-SM)	
					END OF BORING @ 15.00'	
20						
25						
30						

WATER LEVELS ELEVATION (FT)	CALIBRATED PENETROMETER TONS/FT. <sup>2</sup> 1 2 3 4 5+ PLASTIC LIMIT %      WATER CONTENT %      LIQUID LIMIT % X                                  ●                                  Δ 10 20 30 40 50+ STANDARD PENETRATION BLOWS/FT. 10 20 30 40 50+
80	2 (1-1-1-1) 5 (1-2-3-3) 8 (1-2-6-6) 22 (7-10-12-11) 6 (2-3-3-3) 8 (2-4-4-5)
75	
70	
65	
60	
55	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

↓WL 12      WS OR (D)	BORING STARTED      7/2/04	
↓WL(AB) 12      ↓WL(AC)	BORING COMPLETED      7/2/04	CAVE IN DEPTH ● 11
↓WL	RIG ATV      FOREMAN	DRILLING METHOD HSA

K.O. (03-11-04) IA (07-15-04) IA (07-15-04) M.W. (07-16-04) M.W. (07-16-04) M.W. (07-16-04)

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## APPENDIX III

**Williamsburg, VA**

**Project Number: 6958**

**Project Name:** Windsormeade Marketplace BMP

Date: 07/09/2004

**Project Engineer: DJG**

Principal Engineer: MJG

**Summary By: IAA**

[illegible]

V = Virginia Test Method

Hyd = Hydrometer

UCS = Unconfined Compression Soil

OC = Organic Content

S = Standard Proctor

**Con = Consolidation**

UCR = Unconfined Compression Rock

**SA = See Attached**

M = Modified Proctor

**DS = Direct Shear**

**LS = Lime Stabilization**

**NP = Non Plastic**

SummarySheet1.xls

**GS = Specific Gravity**

**CS = Cement Stabilization**

\* = Test Not Conducted

## APPENDIX IV

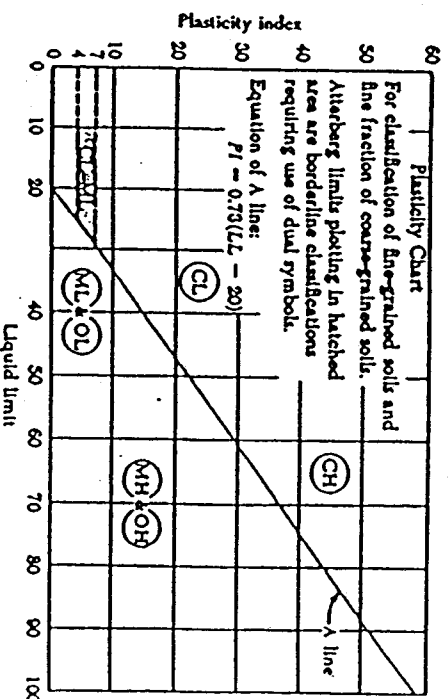
# UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

Table Unified System of Classification

Major divisions	Group symbols	Typical names	Coarse-Grained Soils More than 50% retained on No. 200 sieve		Fine-Grained Soils 50% or more passes No. 200 sieve	
			Gravels 50% or more of coarse fraction retained on No. 4 sieve		Sands More than 50% of coarse fraction passes No. 4 sieve	
			Clean Gravels	Gravels with Fines	Clean Sands	Sands with Fines
	GW	Well-graded gravels and gravel-sand mixtures, little or no fines				
	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines				
	GM	Silty gravels, gravel-sand-silt mixtures				
	GC	Clayey gravels, gravel-sand-clay mixtures				
	SW	Well-graded sands and gravelly sands, little or no fines				
	SP	Poorly graded sands and gravelly sands, little or no fines				
	SM	Silty sands, sand-silt mixtures				
	SC	Clayey sands, sand-clay mixtures				
	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands				
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays				
	OL	Organic silts and organic silty clays of low plasticity				
	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts				
	CH	Inorganic clays of high plasticity, fat clays				
	OH	Organic clays of medium to high plasticity				
	PT	Peat, muck, and other highly organic soils				

Table (Continued)

Classification criteria	
$C_u = D_{60}/D_{10}$ Greater than 4 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	Classification on basis of percentage of fines Less than 5% pass No. 200 sieve GW, GP, SW, SP More than 12% pass No. 200 sieve GM, GC, SM, SC 5% to 12% pass No. 200 sieve Borderline classification requiring use of dual symbols
Not meeting both criteria for GW Afterberg limits plot below "A" line or plasticity index less than 4 Afterberg limits plot above "A" line and plasticity index greater than 7	Not meeting both criteria for SW Afterberg limits plot below "A" line or plasticity index less than 4 Afterberg limits plot above "A" line and plasticity index greater than 7
$C_u = D_{60}/D_{10}$ Greater than 6 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	Afterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols



Visual-manual identification, see ASTM Designation D2488.

# REFERENCE NOTES FOR BORING LOGS

## I. Drilling and Sampling Symbols:

SS - Split Spoon Sampler      DC - Dutch Cone Penetrometer      PM - Pressuremeter      BS - Bulk Sample of Cuttings  
 ST - Shelby Tube Sampler      PA - Power Auger (no sample)      WS - Wash Sample      RB - Rock Bit Drilling  
 RC - Rock Core; NX, BX, AX      HSA - Hollow Stem Auger

Standard Penetration Test (SPT) refers to the blows per foot of a 140 lb hammer free falling 30 inches on a 1 in. O.D. split-spoon sampler, as specified in ASTM D-1586. The SPT blow count is commonly referred to as the N-value. Typically the split-spoon sampler is driven to depths of 18 to 24 inches. The SPT result, N value, is commonly determined by summing the second and third 6-inch increments.

## II. Correlation of Penetration Resistances to Soil Properties:

### COHESIVE SOILS (CLAY, SILT and COMBINATIONS)

CONSISTENCY	SPT, N (Blows/Foot)	UNDRAINED SHEAR STRENGTH C, (PSF)
VERY SOFT	< 2	<250
SOFT	3 - 5	250 - 500
MEDIUM STIFF	6 - 10	500 - 1000
STIFF	11 - 15	1000 - 2000
VERY STIFF	16 - 30	2000 - 4000
HARD	> 31	> 4000

### NON-COHESIVE SOILS (SAND, GRAVEL, SILT and COMBINATIONS)

DENSITY	SPT, N (Blows/Foot)	RELATIVE DENSITY (%)
VERY LOOSE	< 5	0 - 15
LOOSE	6 - 10	16 - 35
MEDIUM DENSE	11 - 30	36 - 65
DENSE	31 - 50	66 - 85
VERY DENSE	51 - 80	86 - 98
EXTREMELY DENSE	> 81	99 - 100

### [Particle Size Identification]:

- Boulders: 8 inch diameter or more
- Cobbles: 3 to 8 inch diameter
- Gravel:
  - Coarse 1 to 3 inch
  - Medium 1/2 to 1 inch
  - Fine 1/4 to 1/2 inch
- Sand:
  - Coarse 2.00 mm to 1/4 inch (diameter of pencil lead)
  - Medium .42 mm to 2.00 mm (diameter of broom straw)
  - Fine .074 mm to .42 mm (diameter of human hair)

## III. Water Level Measurement Symbols:

WL - Water Level      WS - While Sampling      WD - While Drilling      ACR - After Casing Removal  
 WCI - Wet Cave In      DCI - Dry Cave In      BCR - Before Casing Removal

The water levels are those water levels actually measured in the borehole at the times indicated by symbol. The measurements are relatively reliable when augering, without adding drilling fluids, granular soil. In clays and plastic silts, the accurate determination of water levels may require several days for the water level to stabilize. In such cases additional methods of measurement are generally applied.

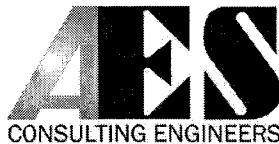


WindsorMeade Marketplace  
James City County Environmental

Submittal for early land disturbance  
July 2, 2004

SP-150-03  
3RD SUBMISSION

Prepared by:



**AES Consulting Engineers**

5248 Olde Towne Road, Suite 1  
Williamsburg, VA 23188  
(757) 253-0040 Fax: (757) 220-8994  
<http://www.aesva.com>

July 1, 2004

Mr. Scott Thomas  
Environmental Division Director  
James City County  
P.O. Box 8784, Building E  
Williamsburg, VA 23187

**RE: Case No. SP-150-03. WindsorMeade Marketplace  
AES Job No. 9069-02**

Dear Mr. Thomas:

This letter is a response to the requested changes made by the Environmental Division to the above referenced site plans. Please note that this submittal only includes the changes requested by the Environmental Division. Additional changes addressing other departments' comments will be made in the following submittal. These changes are being submitted in order to obtain a land disturbance permit for the Windsormeade Marketplace Site. Changes or revisions were made to these documents to address the items provided in your letter of May 19, 2004.

Environmental:

*General Comments:*

1. Plan Information. Comment # 9 was not fully addressed. Information shown for Outparcels 1, 2 and 3 on Environmental Inventory Sheet 2 is not consistent with information shown on Sheets 3, 4, 5 and 8. Provide consistent labeling for outparcels on all sheets.

**The labeling has been modified on sheet 2 and should now be consistent on all the sheets.**

*Erosion & Sediment Control Plan:*

2. Standard E&SC Notes. The standard County erosion and sediment control notes could not be found in the plan set.

**The standard County erosion and sediment control notes were inadvertently omitted from the last submitted plans. Please refer to sheet 12 where these notes have been added.**

3. Outparcel 4. Ensure that it is clear in Step # 4 of the Phase 2 sequence of construction on Sheet 12 that once Temporary Sediment Basin # 4 (SP-93-03) is removed and the retaining wall is being built that additional downslope erosion and sediment control measures may be necessary to be installed. Additional silt fence and culvert inlet protection measures may be necessary especially if removed following construction of WindsorMeade Way Road. There must be adequate erosion and sediment control measures for land-disturbing activities that occur for the wall following removal of temporary sediment basin # 4.

**We have added silt fence to the downstream area per your request. We have also added a note explaining the erosion and sediment control in that area.**

4. Outlet Protections. Show and label outlet protections at storm drainage outfall structures SS # 2-1 and SS # 1-1 consistent with Minimum Standard & Spec. 3.18 and 3.19 of the VESCH. Show class and thickness of rock, pad dimensions and quantities.

class A1

**Standard outlet protection has been added to the plans per your request. We have included computations to support the design of these outfalls**

*Stormwater Management / Drainage:*

5. BMP Points. According to the BMP worksheet, it appears that 10 BMP points were achieved for this site, independent of other WindsorMeade at Williamsburg and New Town west projects. In accordance with the stormwater management plan, provide the conservation easement plat as required for the back (north) 6.93 acres which are being taken for Natural Open Space credit (2.69 points). Also, ensure that the 2.05 acres of postdevelopment drainage area to wet pond SWM/BMP # 1 (SP-93-03) which is being taken for structural point credit for this project is not double counted for credit associated with future WindsorMeade projects or the New Town west project.

**A conservation easement plat will be provided for the area behind the shopping center per your request. Credit for the 2.05 acres of post development drainage area on our project to SWM/BMP #1 (SP-93-03) should only be credited on this project. The original overall SWM masterplan accounted for those 2.05 acres to be included from this project to SWM/BMP #1 (SP-93-03.)**

6. Pond Benches. Information on Sheets 9 and 18 for wet pond BMP # 1 does not appear to comply with County BMP manual requirements for aquatic and safety benches. Provide the necessary benches or submit a written request for variance. A variance request must outline information to support granting of a variance to eliminate a bench or to reduce bench widths.

**Please see the included written request for variance regarding the pond benches.**

7. BMP 1 Hydraulics. Response to previous comment # 25 is acknowledged. A revised "Reservoir Report" could not be found in the revised design report dated April 12, 2004. Provide a new "Reservoir Report" data sheet for BMP # 1 to show input information into the pond's hydraulic model is consistent with your response and information on the plans. *(Note: Besides the schematic diagram as provided, a reservoir input report is needed. The reservoir report must show sizes and elevations associated with the low flow orifice, principal spillway, emergency spillway and the pond barrel, consistent with the revised pond design and construction plan.)*

**A "Reservoir Report" has been included in this submittal package. We have provided a complete report for BMP #1.**

8. Storm Design. Explain how storm drainage structure SS # 1-4 can have a drainage area and inlet time of concentration when construction plan Sheet 8 shows SS # 1-4 to be MH-1 structure. The same is true for storm structure SS # 1-13. Explain how this structure can have a drainage area and time of concentration when Sheet 8 shows this to be a MH-1. For the 15-inch pipe segment between storm drainage structure SS # 1-19 and SS # 1-18, computations in the design report show a pipe slope of 1.63 percent; however, Sheet 8 of the plans show slope at 1.36 percent. Ensure computations in the design report are consistent with information shown on the plans.

**The computations correctly show no drainage area to the runs connected to these manholes (ex. run 3 is relative to MH4.) The time of concentration has been removed for the runs that have no drainage area. The flow values have not changed. We have corrected the slope of the pipe on the plans per your request.**

9. Rock Forebay. Show separation geotextile (between rock and soil) for the forebay in BMP # 1 on the "Forebay Barrier BMP" detail on Sheet 18, consistent with

Mr. Thomas  
July 1, 2004  
Page 4 of 4

**The separation geotextile has been added to forebay detail per your request.**

10. Loading Ramp. It appears the invert out elevation for the 10-inch storm drain from the loading ramp to storm drainage structure SS # 3-2 is incorrect. Using the upstream invert elevation (El. 85.5) and 100 ft. at 1 percent would make the invert out elevation at El. 84.5. Plan information on Sheet 9 shows the invert out at El. 88.5.

**The outfall from the loading dock has been modified.**

11. Geotechnical. Previous comment # 32 was not addressed. Response indicates that a geotechnical report is forthcoming to show that existing soils beneath the wet pond are adequate to sustain a permanent pool as intended for a County type A-3 BMP. Land-disturbing cannot be released until this report is received and approved.

**The geotechnical engineer is currently performing field tests to verify this information.**

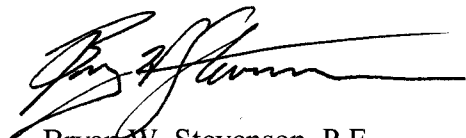
12. Landscaping. Sheet L-1 of the landscape plan must show pond perimeter and bench landscaping and plantings, consistent with the requirements of the County BMP manual and Minimum Standard & Spec. 3.05 of the Virginia Stormwater Management Handbook, for a County type A-3 10 point wet pond.

**Landscaping comments will be addressed on the forthcoming landscaping plans.**

I would like to thank you for your assistance in the review of this project. Should any further questions arise, please feel free to contact us.

Sincerely,

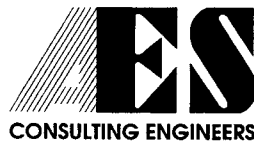
AES Consulting Engineers



Bryan W. Stevenson, P.E.  
Project Engineer

CC: Chris Johnson, Senior Planner

5248 Olde Towne Road • Suite 1  
Williamsburg, VA 23188  
(757) 253-0040 • Fax (757) 220-8994



614 Moorefield Park Drive  
Richmond, VA 23236  
(804) 330-8040 • Fax (804) 330-9840

June 3, 2004

Mr. Scott Thomas  
Environmental Division Director  
James City County  
P.O. Box 8784, Building E  
Williamsburg, Virginia 23187

**RE: Windsormeade Marketplace  
AES Project No. 9069**

Dear Mr. Thomas:


AES Consulting Engineers, on behalf of SLN Williamsburg, LLC, respectfully requests an exception from the Director of the Environmental Division for the James City County extended wet pond BMP bench requirements.

A 5 foot aquatic bench has been provided around all of BMP#1. A 15 foot safety bench is provided on the north side of BMP #1. A 7 foot safety bench is provided on the south side of BMP #1. Although this reduced safety bench width is on the shopping center side of the basin, the BMP is located in a low traffic area. Additionally, we have provided guardrail between the shopping center and the south side of the basin. The 12 foot width for the safety and aquatic benches on the south side and the 20 foot width for the benches on the north side of the basins should provide an adequate recovery area for anyone performing maintenance on the BMP. Access to the riser structure is provided on the side with the 20' wide benches.

We appreciate your help with this matter and hope you will not hesitate to call if you have any further questions.

Sincerely,

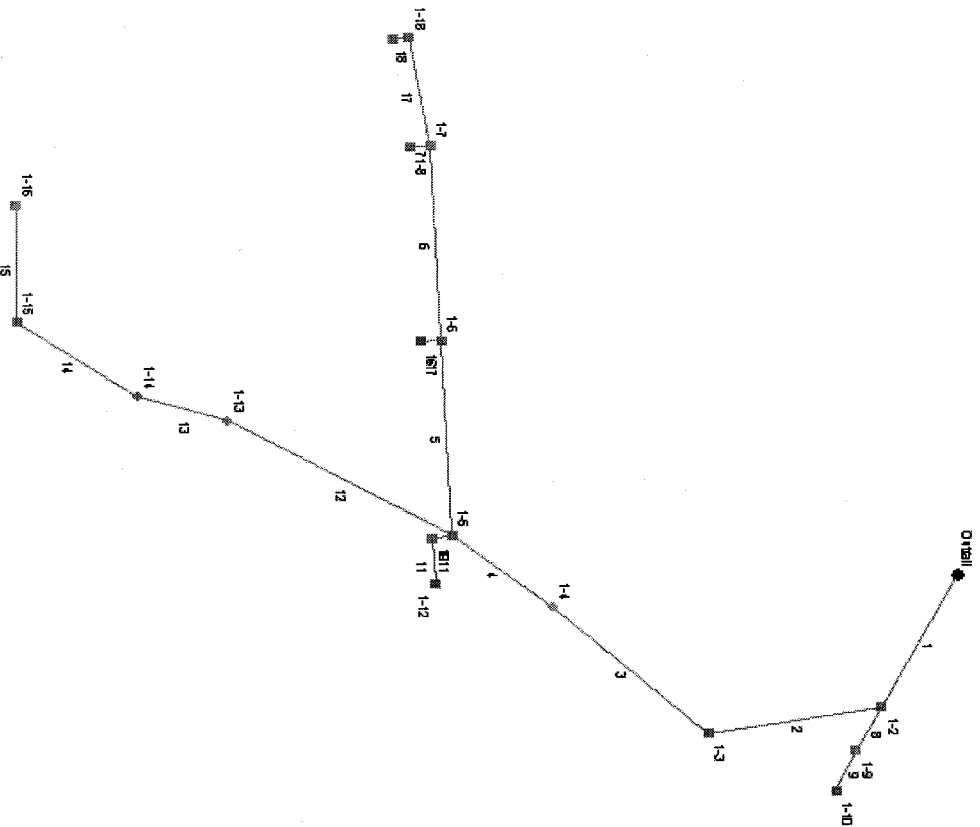
AES Consulting Engineers



Bryan W. Stevenson  
Project Engineer

# Storm Sewer System #1 Hydraflow Plan View

REPRINTED TO SHOW NO TIME OF  
CONCENTRATION AT MANHOLES  
VOLUMES DID NOT CHANGE



Project file: stormsystem#1.stm

No. Lines: 18

07-01-2004

# Storm Sewer Tabulation

BMP is 4R storm sewer

Station	Line To Line	Len (ft)	Drng Area		Rnoft coeff (C)	Area x C		Tc		Rain (l)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
			Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	192.0	1.11	16.49	0.90	1.00	14.72	5.0	21.6	4.3	63.77	106.2	5.08	48	0.55	77.15	76.10	83.50	83.12	86.50	0.00	1-1 to 1-2
2	1	203.0	0.66	13.13	0.90	0.59	11.69	12.0	20.8	4.4	51.63	104.8	4.11	48	0.53	78.23	77.15	84.26	84.00	89.25	86.50	1-2 to 1-3
3	2	243.0	0.00	12.47	0.90	0.00	11.10	0.0	19.8	4.5	50.18	101.8	3.99	48	0.50	79.45	78.23	84.85	84.55	91.00	89.25	1-3 to 1-4
4	3	149.0	1.63	12.47	0.90	1.47	11.10	17.0	19.2	4.6	50.91	101.9	4.05	48	0.50	80.20	79.45	85.07	84.88	88.00	91.00	1-4 to 1-5
5	4	252.0	1.25	6.62	0.90	1.13	5.83	5.0	7.8	6.3	36.96	47.16	5.23	36	0.50	81.46	80.20	86.13	85.35	87.50	88.00	1-5 to 1-6
6	5	252.0	1.14	3.22	0.90	1.03	2.77	5.0	6.2	6.7	18.58	47.16	2.63	36	0.50	82.72	81.46	86.96	86.76	87.50	87.50	1-6 to 1-7
7	6	24.0	1.46	1.46	0.90	1.31	1.31	5.0	5.0	7.0	9.19	38.63	2.93	24	2.92	83.42	82.72	87.16	87.12	87.50	87.50	1-7 to 1-8
8	1	64.0	1.80	2.25	0.90	1.62	2.03	10.0	10.0	5.9	11.93	38.45	3.80	24	2.89	79.00	77.15	84.18	84.00	85.50	86.50	1-9 to 1-2
9	8	56.0	0.45	0.45	0.90	0.41	0.41	8.0	8.0	6.3	2.55	8.63	2.08	15	1.79	80.00	79.00	84.38	84.29	86.50	85.50	1-10 to 1-9
10	4	24.0	1.25	1.86	0.90	1.13	1.67	19.0	19.0	4.6	7.71	40.51	2.45	24	3.21	80.97	80.20	85.38	85.35	88.00	88.00	1-11 to 1-5
11	10	58.0	0.61	0.61	0.90	0.55	0.55	18.0	18.0	4.7	2.59	13.22	2.11	15	4.19	83.40	80.97	85.61	85.52	89.40	88.00	1-12 to 1-11
12	4	300.0	0.00	2.36	0.90	0.00	2.12	0.0	6.8	6.6	13.94	19.24	4.44	24	0.72	82.37	80.20	86.49	85.35	92.40	88.00	1-13 to 1-5
13	12	109.0	0.00	2.36	0.90	0.00	2.12	0.0	6.4	6.7	14.14	15.92	4.50	24	0.50	82.91	82.37	87.06	86.63	93.50	92.40	1-14 to 1-13
14	13	170.0	0.66	2.36	0.90	0.59	2.12	5.0	5.7	6.8	14.46	15.99	4.60	24	0.50	83.76	82.91	87.89	87.20	90.75	93.50	1-15 to 1-14
15	14	151.0	1.70	1.70	0.90	1.53	1.53	5.0	5.0	7.0	10.70	15.83	3.41	24	0.49	84.50	83.76	88.64	88.30	89.25	90.75	1-16 to 1-15
16	5	24.0	2.15	2.15	0.90	1.94	1.94	5.0	5.0	7.0	13.54	39.18	4.31	24	3.00	82.18	81.46	86.85	86.76	87.50	87.50	1-17 to 1-6
17	6	142.0	0.26	0.62	0.70	0.18	0.43	5.0	5.2	6.9	3.01	8.18	2.45	15	1.61	85.00	82.72	87.43	87.12	89.50	87.50	1-18 to 1-7
18	17	18.5	0.36	0.36	0.70	0.25	0.25	5.0	5.0	7.0	1.76	8.23	1.44	15	1.63	85.30	85.00	87.58	87.57	89.50	89.50	1-19 to 1-18

Project File: stormsystem#1.stm

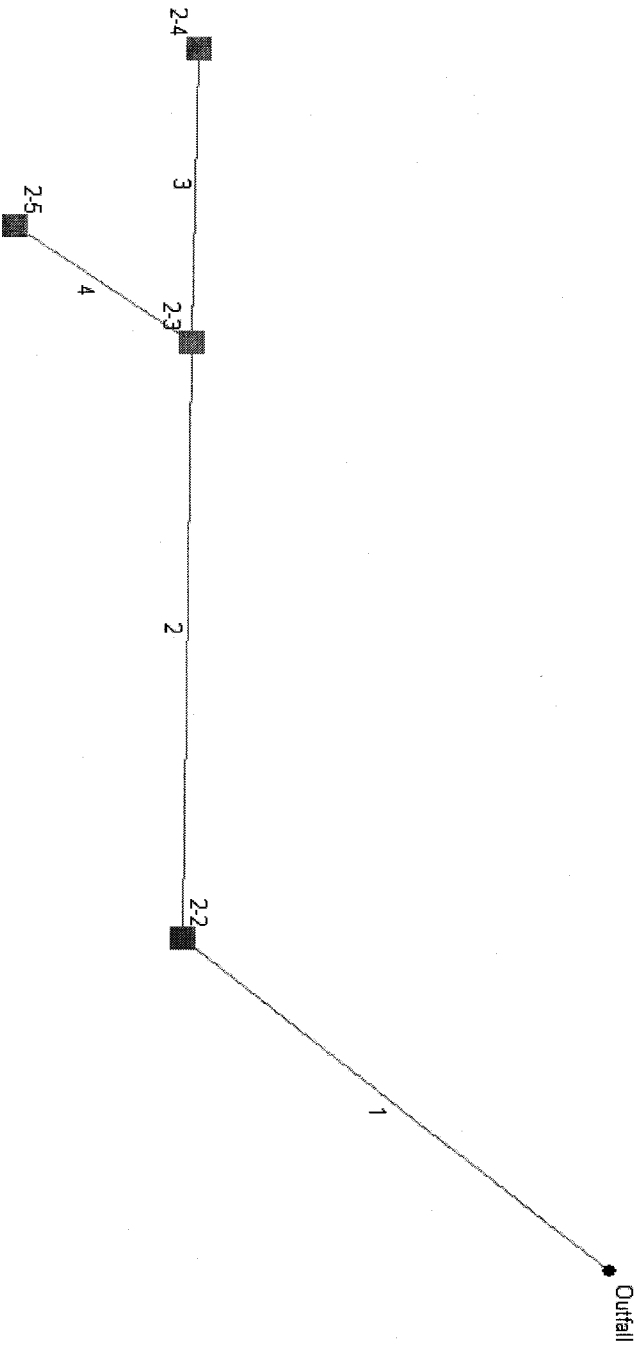
Number of lines: 18

Run Date: 07-01-2004

NOTES: Intensity = 140.36 / (inlet time + 19.80) ^ 0.93; Return period = 10 Yrs.



STORM SEWER SYSTEM # 2 (REVISED)  
Hydraflow Plan View



Project file: stormsystem#2.stm

No. Lines: 4

07-01-2004

# Storm Sewer Tabulation

BMP  
10 yr storm elev. 7

Station		Len	Drng Area		Rnofl coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	139.0	0.73	2.62	0.90	0.66	2.36	5.0	6.5	6.6	15.59	64.12	2.21	36	0.66	78.62	77.70	83.17	83.12	90.12	79.70	2-1 to 2-2
2	1	163.0	0.39	1.89	0.90	0.35	1.70	5.0	5.8	6.8	11.55	20.19	3.68	24	0.57	79.55	78.62	83.56	83.26	87.30	90.12	2-2 to 2-3
3	2	80.0	0.83	0.83	0.90	0.75	0.75	5.0	5.0	7.0	5.23	20.05	1.66	24	0.56	80.00	79.55	83.86	83.82	85.24	87.30	2-3 to 2-4
4	2	54.0	0.67	0.67	0.90	0.60	0.60	5.0	5.0	7.0	4.22	18.17	3.44	15	5.67	82.61	79.55	83.99	83.82	87.75	87.30	2-3 to 2-5
Project File: stormsystem#2.stm																						
Number of lines: 4																						
Run Date: 07-01-2004																						

NOTES: Intensity = 140.36 / (inlet time + 19.80) ^ 0.93; Return period = 10 Yrs.



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Fax: (757) 220-8994

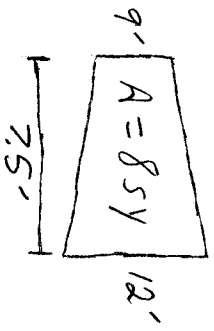
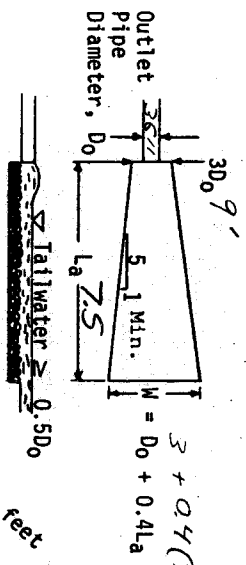
PROJECT WINDSORMEADE MARKETPLACE  
PROJECT NO. #####  
SUBJECT Spread Calc's  
SHEET NO. 1  
DATE #####  
BY BWS

## STORM WATER INLET COMPUTATIONS

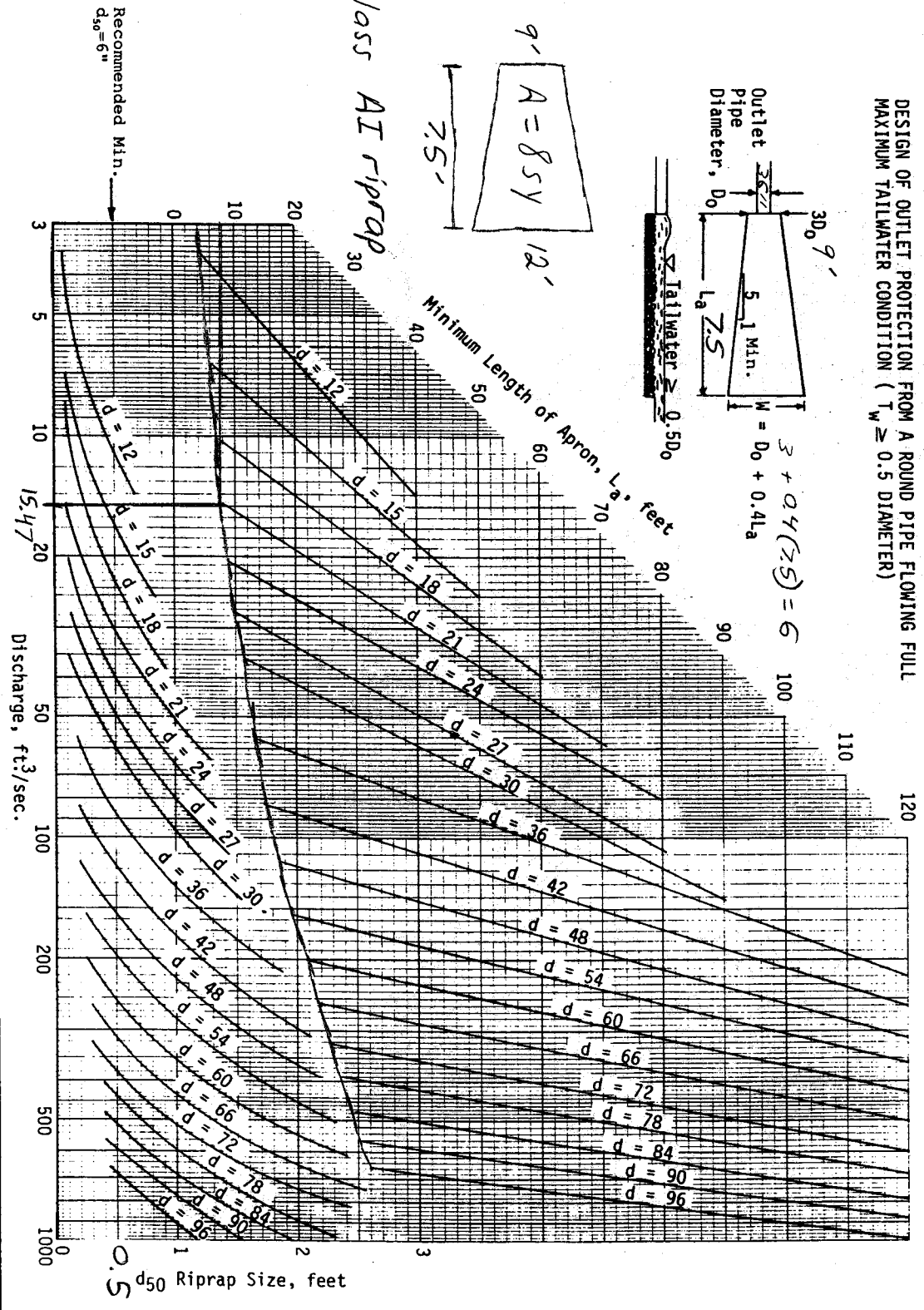
INLET			Station	Drainage Area (Ac)	C	CA	Σ CA	I in/hr	Q-Inter (CFS)	Q Carry-Over (CFS)	Qt Gutter Flow	S Gutter Slope (ft/ft)	Sx Cross Slope (ft/ft)	T(Spread)	W (ft)	W/T	Sw (ft/ft)	Sw/Sx	Eo(#10)	n	Local Dep.	a	S'w =a/(12W)	Se (ft/ft) =Sx+SwEo	Lt (ft) 15 P Effec L	L/Lt (ft)	E(#16) h (ft)	Q Int CFS d/h	Q Carryover Spread	Remark
Number	Type	Length																												
SS2-2	DI-2B	8		0.73	0.9	0.667	0.667	6.4	4.205	0	4.205	0.01	0.02	10.5	2	0.19	0.08	4	0.51	0.015	2	3.44	0.143	0.093	14.23	0.562	0.774	3.254	0.951	
SS2-3	DI-2B	8		0.38	0.9	0.351	0.351	6.4	2.246	0.951	3.197	0.01	0.02	9.3	2	0.215	0.08	4	0.564	0.015	2	3.44	0.143	0.101	12.09	0.662	0.858	2.743	0.454	
SS2-5	DI-2B	10		0.83	0.9	0.747	0.747	6.4	4.781	0	4.781	0.01	0.02	11	2	0.182	0.08	4	0.51	0.015	2	3.44	0.143	0.093	15.02	0.666	0.861	4.116	0.665	
SS2-4	DI-2B	14		0.67	0.9	0.603	0.603	6.4	3.859	1.119	4.978	0.01	0.02	11.2	2	0.179	0.08	4	0.456	0.015	2	3.44	0.143	0.085	16.09	0.87	0.975	4.852	0.127	

SS #2-1 36" pipe 15.47 cfs

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL  
 MAXIMUM TAILWATER CONDITION ( $T_w \geq 0.5$  DIAMETER)

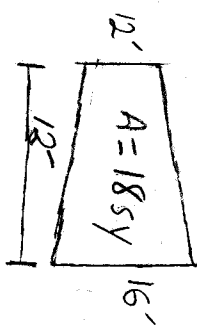
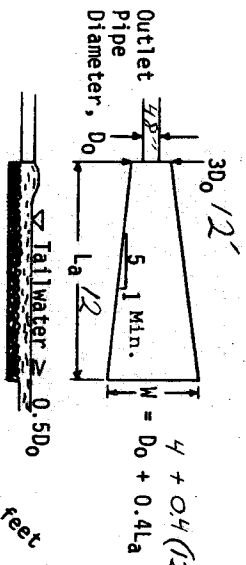


Class AI riprap

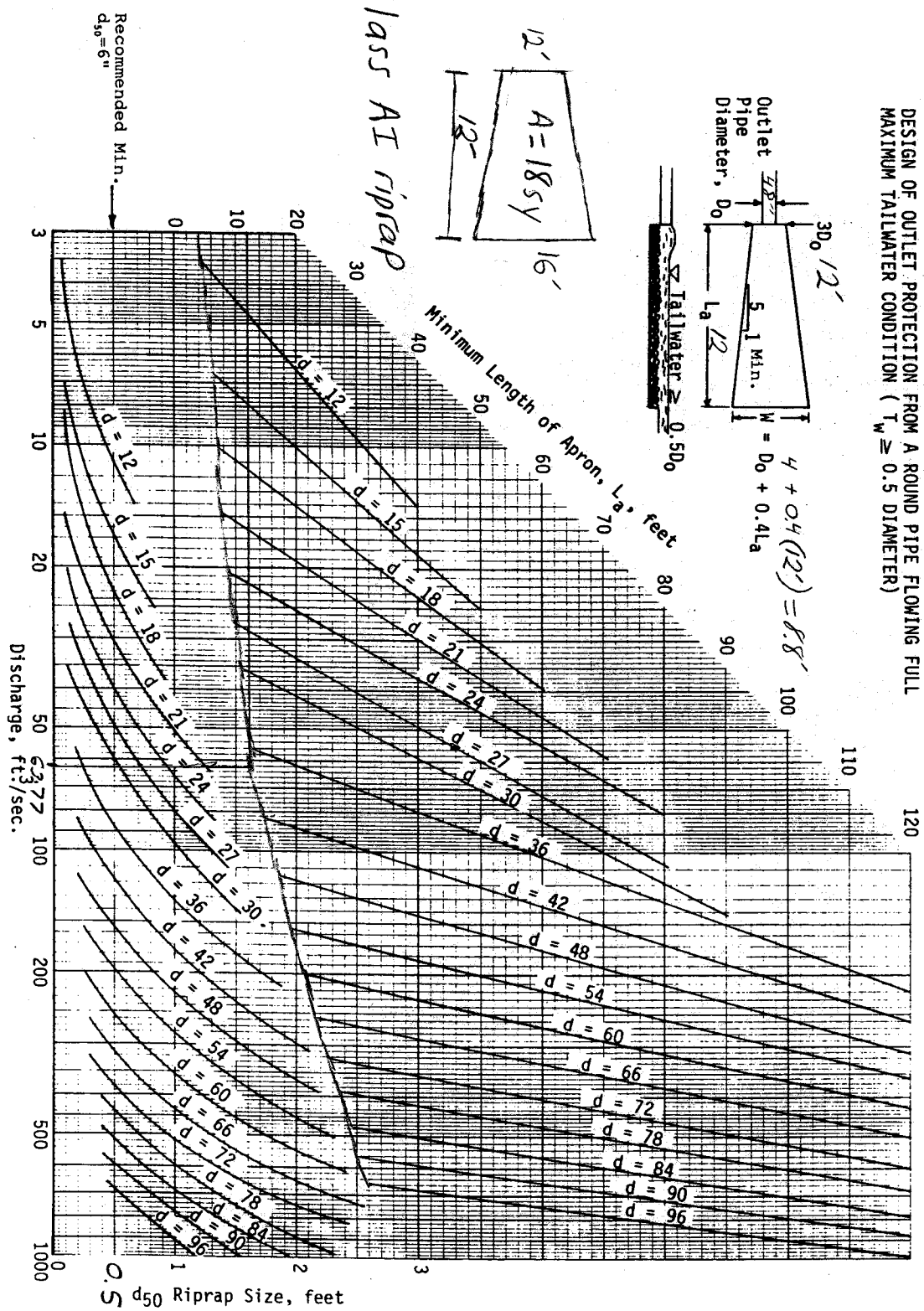


SS# 1-1 48" pipe 63.77 cfs

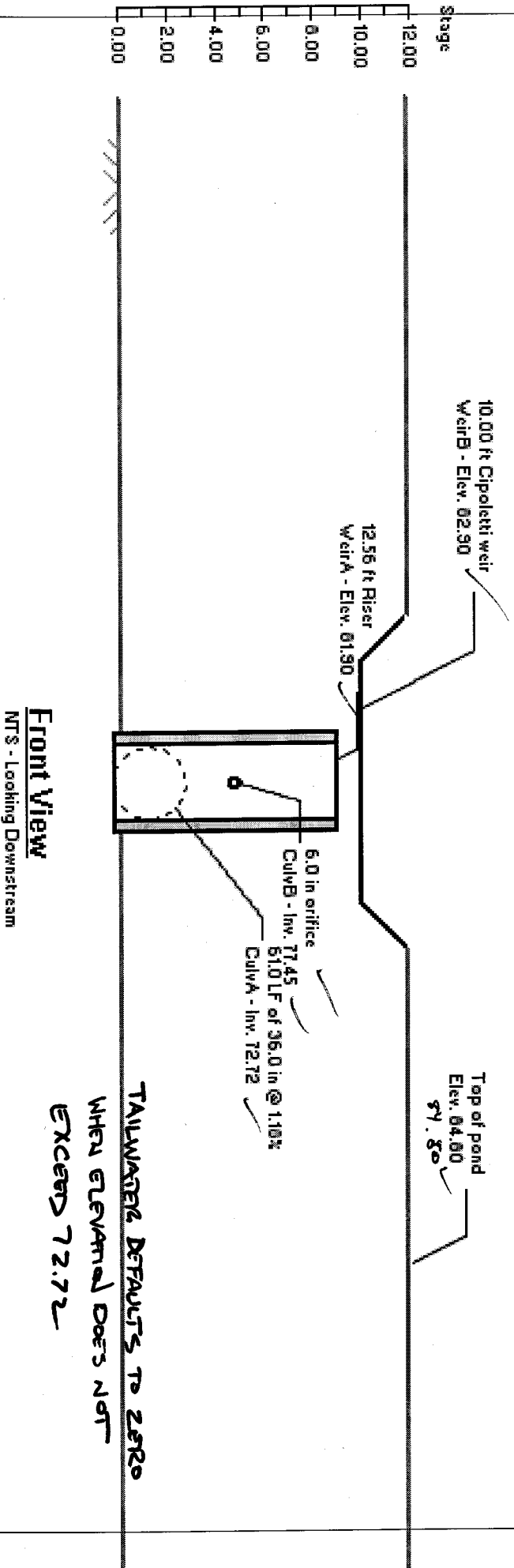
DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL  
 MAXIMUM TAILWATER CONDITION ( $T_w \geq 0.5$  DIAMETER)



Class AI riprap



# WET POND



Schematic only. Not for construction.

# Pond Report

Hydraflow Hydrographs by Intelisolve

Thursday, Jun 3 2004, 3:10 PM

## Pond No. 2 - WET POND

### Pond Data

Pond storage is based on known contour areas. Average end area method used.

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	73.00 ✓	6,701	0	0
1.00	74.00	12,612	9,657	9,657
2.00	75.00	13,689	13,151	22,807
3.00	76.00	14,799	14,244	37,051
4.00	77.00	15,942	15,371	52,422
5.00	78.00	22,057	19,000	71,421
6.00	79.00	27,489	24,773	96,194
7.00	80.00	29,673	28,581	124,775
8.00	81.00	31,917	30,795	155,570
9.00	82.00	34,224	33,071	188,641
10.00	83.00	36,580	35,402	224,043
11.00	84.00 ✓	38,898	37,739	261,782
11.80	84.80	40,842	31,896	293,678

### Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 36.00 ✓	6.00 ✓	0.00	0.00
Span (in)	= 36.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 72.72 ✓	77.45 ✓	0.00	0.00
Length (ft)	= 61.00	0.00	0.00	0.00
Slope (%)	= 1.18	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	Yes	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.56 ✓	10.00 ✓	0.00	0.00
Crest El. (ft)	= 81.90	82.90	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Riser	Cipiti	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.

### Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	Civ D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	73.00	0.00	0.00	---	---	0.00	0.00	---	---	---	0.00
1.00	9,657	74.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
2.00	22,807	75.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
3.00	37,051	76.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
4.00	52,422	77.00	0.62	0.00	---	---	0.00	0.00	---	---	---	0.00
5.00	71,421	78.00	0.62	0.52	---	---	0.00	0.00	---	---	---	0.52
6.00	96,194	79.00	1.13	1.08	---	---	0.00	0.00	---	---	---	1.08
7.00	124,775	80.00	1.43	1.43	---	---	0.00	0.00	---	---	---	1.43
8.00	155,570	81.00	1.76	1.72	---	---	0.00	0.00	---	---	---	1.72
9.00	188,641	82.00	3.30	1.96	---	---	1.32	0.00	---	---	---	3.28
10.00	224,043	83.00	50.43	2.18	---	---	48.25	1.05	---	---	---	51.48
11.00	261,782	84.00	101.65	0.88	---	---	100.77	38.42	---	---	---	140.07
11.80	293,678	84.80	108.73	0.58	---	---	108.15	87.21	---	---	---	195.93

# Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-----	7.11	12.21 ✓	-----	-----	31.96 ✓	37.56 ✓	-----	52.98	PRE-DEVELOPMENT
2	SCS Runoff	-----	43.64	57.71	-----	-----	103.54	115.38	-----	146.77	9069POST-DEVELOPMENT
5	Reservoir	2	1.75	3.76 ✓	-----	-----	62.16 ✓	80.12 ✓	-----	120.86	wet pond



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	7.11	2	736	36,768	---	----	----	PRE-DEVELOPMENT
2	SCS Runoff	43.64	2	726	152,346	---	----	----	9069POST-DEVELOPMENT
5	Reservoir	1.75	2	902	151,107	2	81.11 ✓	159,368	wet pond
bmp#1.GPW					Return Period: 1 Year			Thursday, Jun 3 2004, 3:16 PM	

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	12.21	2	736	58,844	----	-----	-----	PRE-DEVELOPMENT
2	SCS Runoff	57.71	2	726	203,614	----	-----	-----	9069POST-DEVELOPMENT
5	Reservoir	3.76	2	812	202,281	2	82.02 ✓	189,333	wet pond
bmp#1.GPW					Return Period: 2 Year			Thursday, Jun 3 2004, 3:16 PM	

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	31.96	2	736	145,833	---	----	----	PRE-DEVELOPMENT
2	SCS Runoff	103.54	2	726	376,296	---	----	----	9069POST-DEVELOPMENT
5	Reservoir	62.16	2	738	374,911	2	83.12 ✓	228,612	wet pond
bmp#1.GPW					Return Period: 10 Year			Thursday, Jun 3 2004, 3:16 PM	

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	37.56	2	734	170,769	---	----	----	PRE-DEVELOPMENT
2	SCS Runoff	115.38	2	726	421,869	---	----	----	9069POST-DEVELOPMENT
5	Reservoir	80.12	2	736	420,475	2	83.30	235,493	wet pond
bmp#1.GPW					Return Period: 25 Year			Thursday, Jun 3 2004, 3:16 PM	

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	52.98	2	734	239,937	---	---	---	PRE-DEVELOPMENT
2	SCS Runoff	146.77	2	726	543,909	---	---	---	9069POST-DEVELOPMENT
5	Reservoir	120.86	2	732	542,501	2	83.70 ✓ D.H.W	250,461	wet pond
bmp#1.GPW					Return Period: 100 Year			Thursday, Jun 3 2004, 3:16 PM	



# Windsormeade Marketplace

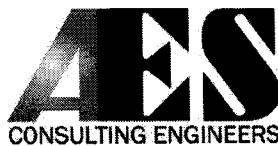
## James City County Environmental

April 12, 2004

SP-150-03  
2ND SVB

1 REDEV  
BMP #1  
A=13.92  
CN=73  
TC=34 min  
POST DEV  
A=20.9 AC  
CN=92  
IMP=1553 AC.  
TC=21 min.

Prepared by:



**AES Consulting Engineers**

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Williamsburg, VA 23188  
(757) 253-0040 Fax: (757) 220-8994  
<http://www.aesva.com>

• NO POND S-S-DISCHARGE  
RATING CURVE INPUT  
INFO.

**CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION  
FOR SWMP POND #1  
WINDSORMEADE MARKETPLACE  
AES Project No.:9069-02  
December 20, 2003  
REV: February 16, 2004**

**I. PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN**

- A. Pre-Development Drainage Area to Point of Concern =  
B. Pre-development Land Use, Soil Classification and Calculation of Composite Curve Number

**13.90 Acres**

	<u>Soil Type</u>	<u>Soil Hydrologic Group</u>	<u>Post-Development Land Use</u>	<u>Area of Land Use (in Acres)</u>	<u>Curve Number for Land Use (CN)</u>	<u>Adjusted (CN)</u>
1)	20-B	B	woods, good condition	0.21	58.0	12
3)	11-B, 11-C, 14-B, 14-C, 15-D, 15-E, 15-F, 29-A	C	woods, good condition	12.11	72.0	872
4)	11C, 20-B, 34-C	D	wwods, good condition	1.60	79	126
<b>Total Adjusted CN =</b>				<b>13.92</b>	<b>1,011</b>	
<b>Composite CN =</b>					<b>73</b>	
C.	<b>Pre-Development Time of Concentration Calculations</b>					
1)	<b>Overland Flow (maximum 300 feet)</b>					
	Surface description (table 5-7)					
	Manning's roughness coefficient, n (table 5-7)					
	Length of overland flow, L					
	2-year 24-hour rainfall, P2					
	Average slope of overland flow, s					
	Travel time, $T_t = (0.007 * (n * L)^{0.8}) / (P2^{0.5} * s^{0.4})$					
						Woods, Good Cond.
						0.4
						250 Feet
						3.5 inches
						0.04 feet per foot
						0.54 hours
2)	<b>Shallow concentrated flow (maximum 300 feet)</b>					
	Surface description, paved or unpaved					
	Length of shallow concentrated flow, L					
	Average slope of shallow concentrated flow, s					
	Average velocity, v					
	Travel time, $T_t = L / (3600 * v)$					
						Wooded, Good Cond.
						300 Feet
						0.03 feet per foot
						2.8 feet per second
						0.03 hours
3)	<b>Channel or Pipe Flow</b>					
	Length of channel flow, L					
	Average velocity of channel flow, v					
	Travel time, $T_t = L / (3600 * v)$					
						0 Feet
						2.5 feet per second
						0.00 hours
<b>Total Time of Concentration =</b>						<b>0.57 hours</b>
				or		<b>34 minutes</b>

## II. POST-DEVELOPMENT CONDITIONS TO POINT OF CONCERN (for total site and Off-site Contributing Areas)

A. Post-Development Drainage Area to Point of Concern =

20.90 Acres

B. Post-development Land Use, Soil Classification and Calculation of Composite Curve Number

	Soil Type	Soil Hydrologic Group	Post-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	20-B	C	woods, good condition	1.91	72.0	138
3)	11-B, 11-C, 14-B, 14-C, 15-D, 15-E, 15-F, 29-A	A	commercial	1.20	89.0	107
4)	11-C, 20-B, 34-C	B	commercial	0.29	90	26
6)	11-B, 11-C, 14-B, 14-C, 15-D, 15-E, 15-F, 29-A	C	commercial	16.20	94	1,523
7)	20-B	D	commercial	1.26	95	120
Total Adjusted CN =				20.86		1,913
Composite CN =						92

15.3 ac  
imprv.

C. Post-Development Time of Concentration Calculations

- 1) Overland Flow (maximum 300 feet)  
Surface description (table 5-7)  
Manning's roughness coefficient, n (table 5-7)  
Length of overland flow, L  
2-year 24-hour rainfall, P2  
Average slope of overland flow, s  
Travel time,  $T_t = (0.007 * (n * L)^{0.8}) / (P2^{0.5} * s^{0.4})$   
Woods, good condition  
0.4  
100 Feet  
3.5 inches  
0.03 feet per foot  
0.29 hours
- 2) Shallow concentrated flow (maximum 300 feet)  
Surface description, paved or unpaved  
Length of shallow concentrated flow, L  
Average slope of shallow concentrated flow, s  
Average velocity, v  
Travel time,  $T_t = L / (3600 * v)$   
paved  
115 Feet  
0.01 feet per foot  
2.00 feet per second  
0.02 hours
- 3) Channel or Pipe Flow  
Length of channel flow, L  
Average velocity of channel flow, v  
Travel time,  $T_t = L / (3600 * v)$   
812 Feet  
5.6 feet per second  
0.04 hours

Total Time of Concentration =

or

0.35 hours  
21 minutes

c 34 min OK

## III. PROPOSED ESTIMATED POND(S) VOLUME

Elevation	Depth	Area (sq. ft.)	Incremental Volume (cu. ft.)	Inc. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
73	0	6701	0	0	0	0
74	1	12,612	9,657	358	9,657	358
75	1	13,689	13,151	487	22,807	845
76	1	14,799	14,244	528	37,051	1,372
77	1	15,942	15,371	569	52,422	1,942
78	1	22,057	19,000	704	71,421	2,645
79	1	27,489	24,773	918	96,194	3,563
80	1	29,673	28,581	1,059	124,775	4,621
81	1	31,917	30,795	1,141	155,570	5,762
82	1	34,224	33,071	1,225	188,641	6,987
83	1	36,580	35,402	1,311	224,043	8,298
84	1	38,898	37,739	1,398	261,782	9,696
85	1	40,842	39,870	1,477	301,652	11,172

21 seems high for highly dev site.



#### IV. DETERMINING REQUIRED WATER QUALITY VOLUME

Due to preliminary considerations, it is desired to provide this site extended detention wet pond to achieve a 10 point BMP rating for the facility. Under the James City County guide lines for storm water management BMPs, the extended detention wet pond may have one half of the water quality volume stored in the permanent pool and one half of the water quality volume released in a 24-hour period.

Percent Impervious of the BMP Watershed, Post-Development	73.2%		
Drainage Area of the BMP Watershed	20.90	acres	✓
Impervious Acres of BMP Watershed	15.30	acres	✓
Calculation for Water Quality Volume, WQ <sub>v</sub>			
WQ <sub>v</sub> = (2.0 inches per impervious acre) * (impervious acres of BMP watershed)			
WQ <sub>v</sub> = (2.0 inches) * (1 ft / 12 inches) * (43560 sq. Ft per acre) * (impervious acres of BMP watershed)			
WQ <sub>v</sub> = (2.0 inches) * (1 ft / 12 inches) * (43560 sq. Ft per acre) *	16.80	=	121968 cu. Ft
WQ <sub>v</sub> =	60984 cu. Ft	Required Volume for Permanent Pool	
	60984 cu. Ft	Design Volume for Dry Storage	
		(1" per Impervious Acre)	
WQ <sub>v</sub> (provided)=	60984 cu. Ft	Water Quality Volume Provided for Wet pool	
	124350 cu. Ft	Water Quality Volume Provided for Dry pool	
	185334	Total Water quality volume	
Elevation of total WQ <sub>v</sub> =	81.9		✓
Elevation of release inlet for 1/2 water quality volume =	77.5		✓
Average head, in feet, on release inlet =	2.2		✓
Average release rate calculation	$\frac{124,350.0 \text{ cubic feet}}{(24 \text{ hours} \times 60 \text{ minutes/hour} \times 60 \text{ seconds/minute})}$		= 1.4 cfs

#### Calculation of size of release inlet for 1/2 Water Quality Volume

Diameter of Release Inlet =  $2 * (Q / ((64.32 * (h / 2))^{1/2} * 0.6 * 3.14)))^{1/2}$   
 where, Q equals Average Release Rate, in cfs  
 h equals Average Head, in feet

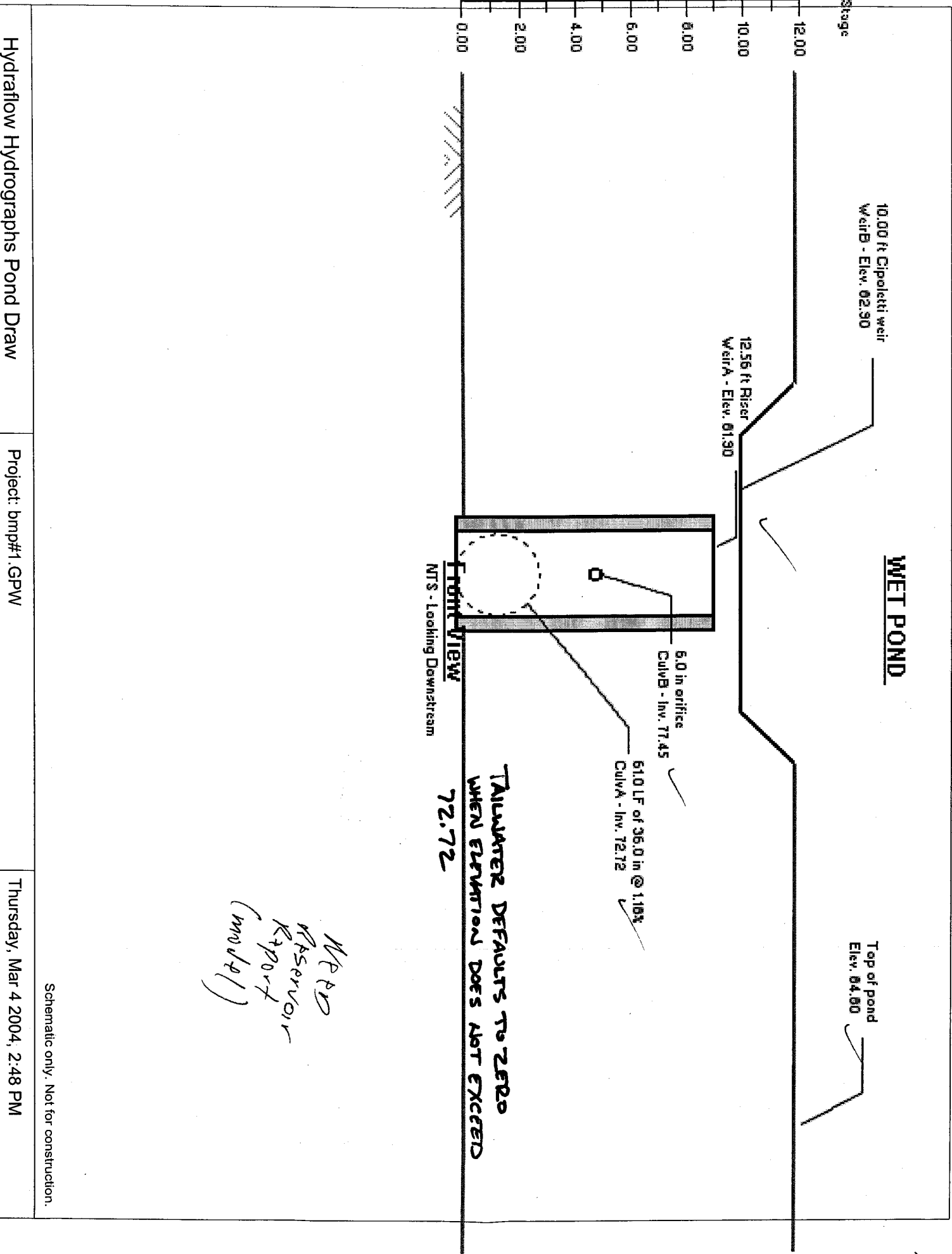
Diameter of Release Inlet = 0.60 feet, or 8 inches ✓

Note: A design with an orifice size of 6" will be used for channel protection requirements ✓

6" ON PLAN

185334 7 121968 CF O.K.





Hydraflow Hydrographs Pond Draw

Project: bmp#1.GPW

Thursday, Mar 4 2004, 2:48 PM

Schematic only. Not for construction.

# Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-----	7.11	12.21	-----	-----	31.99	37.60	-----	53.03	PRE-DEVELOPMENT
2	SCS Runoff	-----	43.66	57.74	-----	-----	103.59	115.43	-----	146.84	9069POST-DEVELOPMENT
5	Reservoir	2	1.75	3.76	-----	-----	62.16	80.12	-----	120.88	wet pond
<div> <div>Proj. file: bmp#1.GPW</div> <div>Run date: 02-18-2004</div> </div>											

# Hydrograph Summary Report

Page 1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	7.11	2	736	36,768	---	----	----	PRE-DEVELOPMENT
2	SCS Runoff	43.66	2	726	152,346	---	----	----	9069POST-DEVELOPMENT
5	Reservoir	1.75	2	902	147,696	2	81.11 ✓	159,364	wet pond
Proj. file: bmp#1.GPW			Return Period: 1 yr			Run date: 02-18-2004			

# Hydrograph Summary Report

Page 1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	12.21	2	736	58,844	---	----	----	PRE-DEVELOPMENT
2	SCS Runoff	57.74 <sup>138</sup>	2	726	203,614	---	----	----	9069POST-DEVELOPMENT
5	Reservoir	3.76	2	812	195,647	2	82.02 ✓	189,332	wet pond
Proj. file: bmp#1.GPW				Return Period: 2 yr				Run date: 02-18-2004	

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	31.99	2	736	145,833	---	----	----	PRE-DEVELOPMENT
2	SCS Runoff	103.59	2	726	376,296	---	----	----	9069POST-DEVELOPMENT
5	Reservoir	62.16	2	738	364,615	2	83.12 ✓	228,614	wet pond
Proj. file: bmp#1.GPW			Return Period: 10 yr			Run date: 02-18-2004			

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	37.60	2	734	170,769	---	----	----	PRE-DEVELOPMENT
2	SCS Runoff	115.43	2	726	421,869	---	----	----	9069POST-DEVELOPMENT
5	Reservoir	80.12	2	736	409,431	2	83.30	235,495	wet pond
Proj. file: bmp#1.GPW				Return Period: 25 yr				Run date: 02-18-2004	



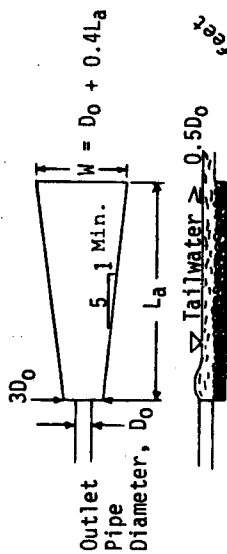
# Hydrograph Summary Report

Page 1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	53.03	2	734	239,937	---	-----	-----	PRE-DEVELOPMENT
2	SCS Runoff	146.84	2	726	543,909	---	-----	-----	9069POST-DEVELOPMENT
5	Reservoir	120.88	2	732	530,212	2	83.70 DHW ✓	250,474	wet pond
Proj. file: bmp#1.GPW			Return Period: 100 yr			Run date: 02-18-2004			

BMP #1 OUTLET PROTECTION 10 YEAR STORM  $Q_{10} = 62.16 \text{ cfs}$

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL  
MAXIMUM TAILWATER CONDITION ( $T_w \geq 0.5 \text{ DIAMETER}$ )



DESIGN FOR MIN.  $L_a$  REQ'D  
FOR 36" ASTRAL DPE

$L_a = 20'$   
 $3D_o = 9'$   
 $W = 11'$



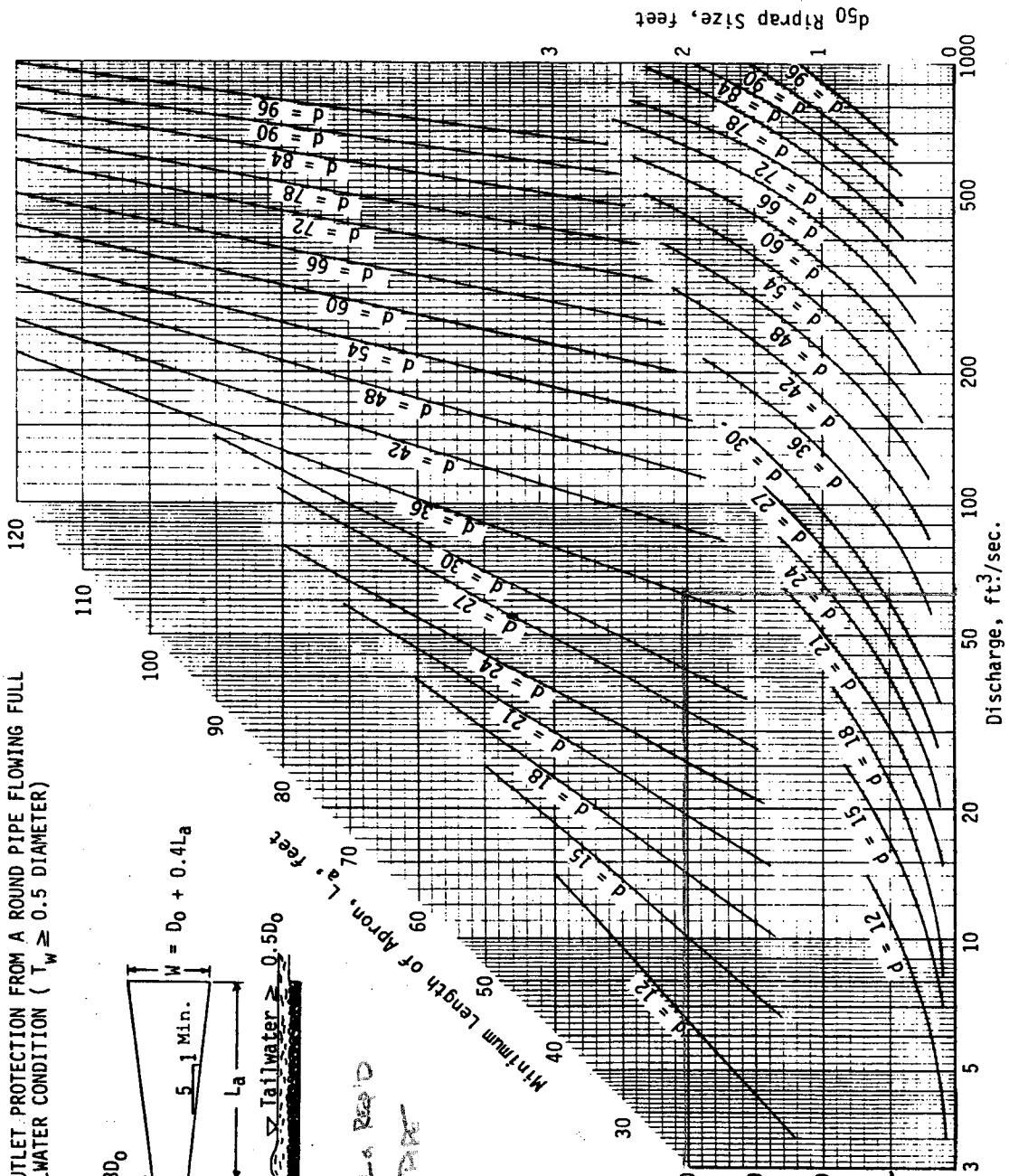
AREA =  $9 \times 30 + 2(9 \times 10)$

= 200 SF

= 22.5'

Recommended Min.  
 $d_{50} = 6"$

USE  $d_{50} = 6"$



AES Project No. 9069  
Job Title BMP No. 1

Area=	20.90 Acres	0.0327sq.mi.
CN=	91	
Tc=	0.350 hr.	
P=	2.8 in.	Rainfall depth for 1yr return period
Ia=	0.198	Initial abstraction is all losses before runoff begins. ie surface depressions, water intercepted by vegetation, evaporation.....(See TR55 Chapter 2, Equation 2-1)
Qu=	630.41 csm/in	Unit Peak Discharge - Peak discharge per square mile per inch of runoff (Units are "cubic square miles per ing
Direct Runoff=	1.9 in.	Runoff in inches (See TR55 Chapter 2, Equation 2-1)
Qi=	38.82 cfs	Peak Inflow Discharge
Qo/Qi=	0.028	Ratio of Peak Inflow Discharge to Peak Outflow Discharge (See TR55 Chapter 6)
Qo=	1.08 cfs	Peak Outflow Discharge (See TR55 Chapter 6) Taken from Maryland Dept. of Stormwater Management Appendix D.11, figured.11.2. The curve for 24hr detention used in Chart 1 was scaled and a curve was fit to the data points. The resulting equation, which appears on the chart yeilds a very good fit.
Vs/Vr=	0.644	Ratio of Volume Stored to Volume Realeased (See TR55 Chapter 6). Value Computed
Vs=	2.113 Ac-Ft	using equation for Figure 6-1 as shown in Appendix F.
Vs=	92,056 cu.ft. ✓	Required Storage Volume

Average Flow Rate (Qo) 1.08 cfs  
Average head= 1.55 ft.

Area of orifice= 0.18 sq.ft.

Orifice diameter = 0.48 ft.  
Orifice diameter = 5.7 in.

~ 6" OK.

This offers a place to start. After routing the 1yr storm through the oriface check the out put to make sure that the Required Storage Volume is actually detained for 24 hours. If not adjust the orifice size and recompute.

REVISED SEDIMENT BASIN #1 CALCULATIONS

FOR ULTIMATE DRAINAGE SITUATION

1992 [14.88 AC IN PHASE I, 20.90 AC IN PHASE II]

3.14

### TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project WINDSORMEADE MARKETPLACE

Basin # 1 Location BEHIND SHOPPING CENTER

Total area draining to basin: 20.90 acres. ✓

#### Basin Volume Design

##### Wet Storage:

1. Minimum required volume = 67 cu. yds. x Total Drainage Area (acres).

$$67 \text{ cu. yds.} \times \underline{20.90} \text{ acres} = \underline{1400} \text{ cu. yds.} \quad \checkmark$$

2. Available basin volume = 2258 cu. yds. at elevation 77.45. (From storage - elevation curve)

3. Excavate \_\_\_\_\_ cu. yds. to obtain required volume\*.

\* Elevation corresponding to required volume = invert of the dewatering orifice.

4. Available volume before cleanout required.

$$33 \text{ cu. yds.} \times \underline{20.9} \text{ acres} = \underline{690} \text{ cu. yds.}$$

5. Elevation corresponding to cleanout level = 74.68. ✓

(From Storage - Elevation Curve)

6. Distance from invert of the dewatering orifice to cleanout level = 2.77 ft. ✓  
(Min. = 1.0 ft.)

##### Dry Storage:

7. Minimum required volume = 67 cu. yds. x Total Drainage Area (acres).

$$67 \text{ cu. yds.} \times \underline{20.90} \text{ acres} = \underline{1400} \text{ cu. yds.}$$

1992

1400  
1400  
2800

6987

3.14

8. Total available basin volume at crest of riser\* = 6864 cu. yds. at elevation 81.90. (From Storage - Elevation Curve)

\* Minimum = 134 cu. yds./acre of total drainage area.

9. Diameter of dewatering orifice = 6 in. DESIGNED WITH TEMP. CHECKED AND DECREASED DECREASE DRAIN DOWN TIME
10. Diameter of flexible tubing = 8 in. (diameter of dewatering orifice plus 2 inches).

### Preliminary Design Elevations

11. Crest of Riser = 81.90 ✓
- Top of Dam = 84.80 ✓
- Design High Water = 83.30 ✓
- Upstream Toe of Dam = 72.00 ✓

### Basin Shape

12.  $\frac{\text{Length of Flow}}{\text{Effective Width}} = \frac{L}{We} = \frac{165}{80}$  ✓
- If > 2, baffles are not required 2.1
- If < 2, baffles are required \_\_\_\_\_

### Runoff

13.  $Q_2 = \underline{57.74}$  cfs (From Chapter 5) ✓
14.  $Q_{25} = \underline{115.43}$  cfs (From Chapter 5) ✓

POSTPONED not disturbed  
CN = 92 7 8 10 DIC.

### Principal Spillway Design

15. With emergency spillway, required spillway capacity  $Q_p = Q_2 = \underline{57.74}$  cfs. (riser and barrel)
- Without emergency spillway, required spillway capacity  $Q_p = Q_{25} = \underline{\hspace{2cm}}$  cfs. (riser and barrel)

16. With emergency spillway:

$$\text{Assumed available head (h)} = \underline{1} \text{ ft. (Using } Q_2\text{)}$$

$$h = \text{Crest of Emergency Spillway Elevation} - \text{Crest of Riser Elevation}$$

Without emergency spillway:

$$\text{Assumed available head (h)} = \underline{1.4} \text{ ft. (Using } Q_{25}\text{)}$$

$$h = \text{Design High Water Elevation} - \text{Crest of Riser Elevation}$$

17. Riser diameter ( $D_r$ ) = 48 in. Actual head (h) = 1.3 ft.

(From Plate 3.14-8.)

Note: Avoid orifice flow conditions.

18. Barrel length (l) = 61 ft. ✓

$$\text{Head (H) on barrel through embankment} = \underline{12.3} \text{ ft.}$$

(From Plate 3.14-7).

19. Barrel diameter = 36 in. ✓

(From Plate 3.14-B [concrete pipe] or Plate 3.14-A [corrugated pipe]).

20. Trash rack and anti-vortex device

$$\text{Diameter} = \underline{72} \text{ inches.}$$

$$\text{Height} = \underline{21} \text{ inches.}$$

(From Table 3.14-D).

### Emergency Spillway Design

21. Required spillway capacity  $Q_e = Q_{25} - Q_p = \underline{57.69}$  cfs.

22. Bottom width (b) = 10 ft.; the slope of the exit channel (s) = \_\_\_\_\_ ft./foot; and the minimum length of the exit channel (x) = \_\_\_\_\_ ft.

(From Table 3.14-C).

CONCRETE SPILLWAY; NOT VEGETATED

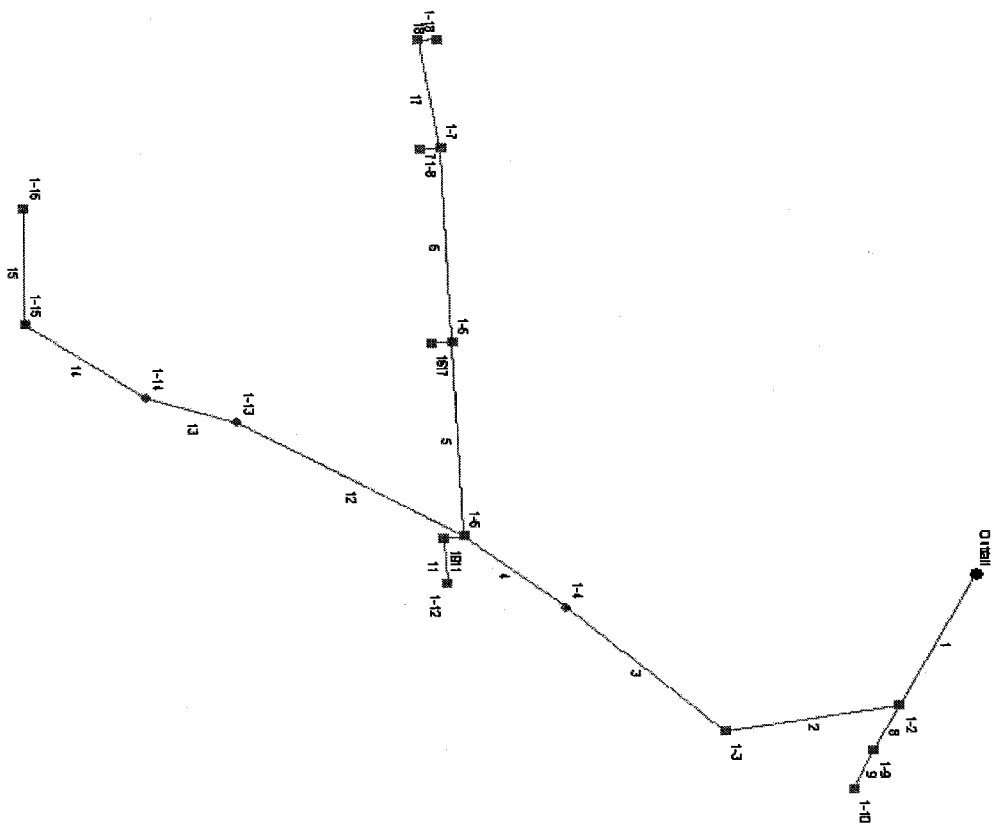
### Anti-Seep Collar Design

23. Depth of water at principal spillway crest (Y) = 9 ft.  
Slope of upstream face of embankment (Z) = 3 :1.  
Slope of principal spillway barrel ( $S_b$ ) = 1.13 %  
Length of barrel in saturated zone ( $L_s$ ) = 35 ft.
24. Number of collars required = 2 dimensions = 6' x 6'  
(from Plate 3.14-12).

## Final Design Elevations

25. Top of Dam = 84.80
- Design High Water = 83.30  
25 yr
- Emergency Spillway Crest = 82.90
- Principal Spillway Crest = 81.90
- Dewatering Orifice Invert = 77.45
- Cleanout Elevation = 74.68
- Elevation of Upstream Toe of Dam  
or Excavated Bottom of "Wet Storage  
Area" (if excavation was performed) = 72.00

Hydraflow Plan View



Project file: stormsystem#1.stm	No. Lines: 18	04-08-2004
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# Storm Sewer Tabulation

Station	Line To Line	Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
			Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	192.0	1.11	16.49	0.90	1.00	14.72	5.0	21.6	4.3	63.77	106.2	5.08	48	0.55	77.15	76.10	83.50	83.12	87.00	0.00	1-1 to 1-2
2	1	203.0	0.66	13.13	0.90	0.59	11.69	12.04	20.8	4.4	51.63	104.8	4.11	48	0.53	78.23	77.15	84.26	84.00	89.75	87.00	1-2 to 1-3
3	2	243.0	0.00	12.47	0.90	0.00	11.10	5.0	19.8	4.5	50.18	101.8	3.99	48	0.50	79.45	78.23	84.85	84.55	91.50	89.75	1-3 to 1-4
4	3	149.0	1.63	12.47	0.90	1.47	11.10	17.0	19.2	4.6	50.91	101.9	4.05	48	0.50	80.20	79.45	85.07	84.88	88.50	91.50	1-4 to 1-5
5	4	252.0	1.25	6.62	0.90	1.13	5.83	5.0	7.8	6.3	36.96	47.16	5.23	36	0.50	81.46	80.20	86.13	85.35	88.00	88.50	1-5 to 1-6
6	5	252.0	1.14	3.22	0.90	1.03	2.77	5.0	6.2	6.7	18.58	47.16	2.63	36	0.50	82.72	81.46	86.96	86.76	88.00	88.00	1-6 to 1-7
7	6	24.0	1.46	1.46	0.90	1.31	1.31	5.0	5.0	7.0	9.19	38.63	2.93	24	2.92	83.42	82.72	87.16	87.12	88.00	88.00	1-7 to 1-8
8	1	64.0	1.80	2.25	0.90	1.62	2.03	10.0	10.0	5.9	11.93	38.45	3.80	24	2.89	79.00	77.15	84.18	84.00	86.00	87.00	1-9 to 1-2
9	8	56.0	0.45	0.45	0.90	0.41	0.41	8.0	8.0	6.3	2.55	8.63	2.08	15	1.79	80.00	79.00	84.38	84.29	87.00	86.00	1-10 to 1-9
10	4	24.0	1.25	1.86	0.90	1.13	1.67	19.0	19.0	4.6	7.71	40.51	2.45	24	3.21	80.97	80.20	85.38	85.35	88.50	88.50	1-11 to 1-5
11	10	58.0	0.61	0.61	0.90	0.55	0.55	18.0	18.0	4.7	2.59	13.22	2.11	15	4.19	83.40	80.97	85.61	85.52	89.90	88.50	1-12 to 1-11
12	4	300.0	0.00	2.36	0.90	0.00	2.12	5.0	6.8	6.6	13.94	19.24	4.44	24	0.72	82.37	80.20	86.49	85.35	92.90	88.50	1-13 to 1-5
13	12	109.0	0.00	2.36	0.90	0.00	2.12	5.0	6.4	6.7	14.14	15.92	4.50	24	0.50	82.91	82.37	87.06	86.63	94.00	92.90	1-14 to 1-13
14	13	170.0	0.66	2.36	0.90	0.59	2.12	5.0	5.7	6.8	14.46	15.99	4.60	24	0.50	83.76	82.91	87.89	87.20	91.25	94.00	1-15 to 1-14
15	14	151.0	1.70	1.70	0.90	1.53	1.53	5.0	5.0	7.0	10.70	15.83	3.41	24	0.49	84.50	83.76	88.64	88.30	89.75	91.25	1-16 to 1-15
16	5	24.0	2.15	2.15	0.90	1.94	1.94	5.0	5.0	7.0	13.54	39.18	4.31	24	3.00	82.18	81.46	86.85	86.76	88.00	88.00	1-17 to 1-6
17	6	142.0	0.26	0.62	0.70	0.18	0.43	5.0	5.2	6.9	3.01	8.18	2.45	15	1.61	85.00	82.72	87.43	87.12	90.00	88.00	1-18 to 1-7
18	17	18.8	0.36	0.36	0.70	0.25	0.25	5.0	5.0	7.0	1.76	8.23	1.44	15	1.63	85.30	85.00	87.58	87.57	90.00	90.00	1-19 to 1-18

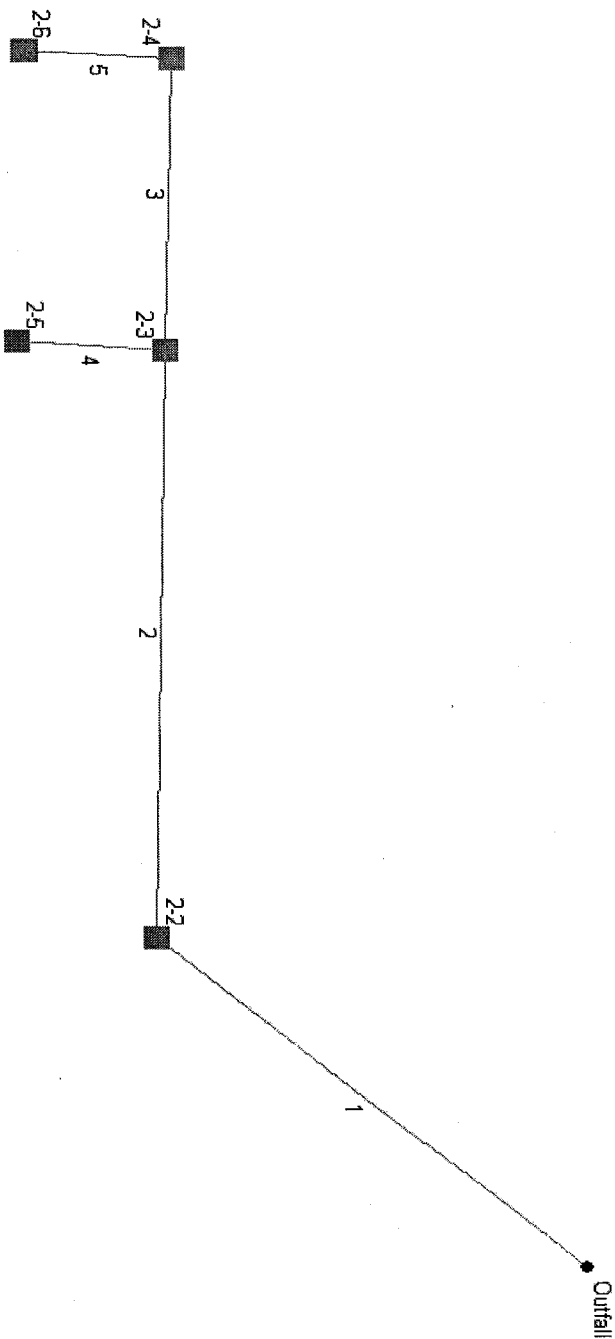
Project File: stormsystem#1.stm

Number of lines: 18

Run Date: 04-08-2004

NOTES: Intensity = 140.36 / (Inlet time + 19.80) ^ 0.93; Return period = 10 Yrs.

Hydraflow Plan View



# Storm Sewer Tabulation

Final Water Elevations BMP #1  
10 Yr Storm

Station	Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
		Incr	Total		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
Line To Line	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	139.0 ✓	0.73	2.63	0.90	0.66	5.0	6.9	6.5	15.47 ✓	64.12	2.19	36 ✓	0.66 ✓	78.62 ✓	77.70 ✓	83.17 ✓	83.12 ✓	90.12	79.70	2-1 to 2-2
2	1	163.0 ✓	0.39	1.90	0.90	0.35	5.0	6.1	6.7	11.48 ✓	20.19	3.65	24 ✓	0.57 ✓	79.55 ✓	78.62 ✓	83.56 ✓	83.26 ✓	87.30 ✓	90.12 ✓	2-2 to 2-3
3	2	80.0 ✓	0.71	0.98	0.90	0.64	5.0	5.4	6.9	6.07 ✓	20.05	1.93	24	0.56	80.00	79.55	83.91 ✓	83.87 ✓	85.24	87.30	2-3 to 2-4
4	2	36.0 ✓	0.53	0.53	0.90 ✓	0.48	5.0	5.0	7.0	3.34 ✓	18.17	2.72	15 ✓	5.67 ✓	81.59 ✓	79.55 ✓	83.94 ✓	83.87 ✓	87.75 ✓	87.30 ✓	2-3 to 2-5
5	3	36.0 ✓	0.27	0.27	0.90 ✓	0.24	5.0	5.0	7.0	1.70 ✓	17.99	1.39	15 ✓	5.56 ✓	82.00 ✓	80.00 ✓	84.01 ✓	84.00 ✓	86.00 ✓	85.24 ✓	2-4 to 2-6
<div>incurs 1000 ft and 1000 ft of 1000 ft</div>																					
Project File: stormsystem#2.stm																					
Number of lines: 5															Run Date: 04-07-2004						

NOTES: Intensity = 140.36 / (Inlet time + 19.80) ^ 0.93; Return period = 10 Yrs.

# Hydraflow Plan View



Project file: stormsystem#3.stm

No. Lines: 1

04-07-2004

# Storm Sewer Tabulation

TAKUMAKI COUNCIL DISTRICT 1  
124th STREET

Station	Line To Line	Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
			Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	50.0	1.13	1.13	0.90	1.02	1.02	5.0	5.0	7.0	7.11	21.18	5.80	15	7.70	81.55	77.70	83.55	83.12	90.55	78.95	
INCLUDES 10" HDPE FROM LOADING RAMP.																						

Project File: stormsystem#3.sim

Number of lines: 1

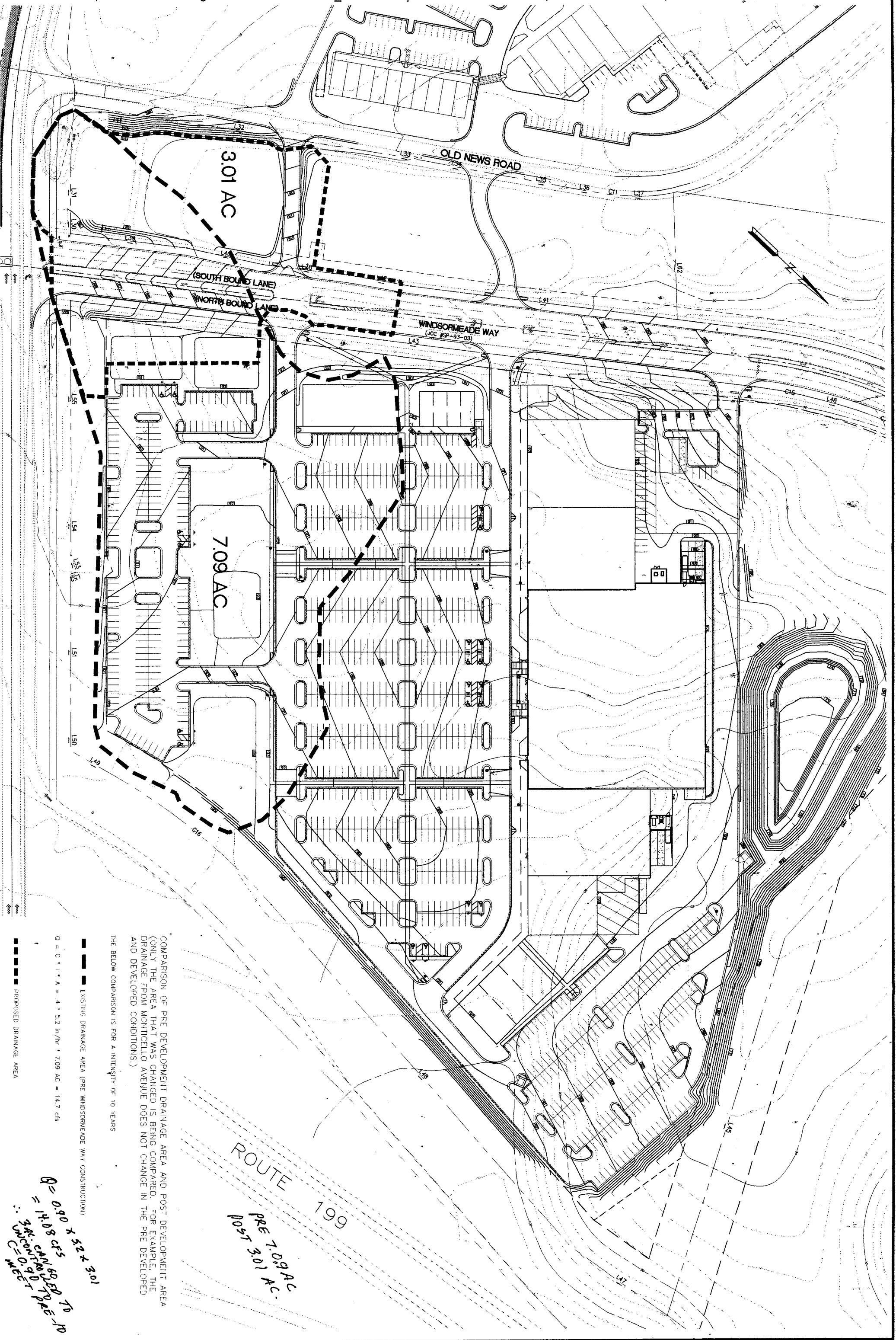
Run Date: 04-07-2004

Project File: stormsystem#3.stm

Number of lines: 1

Run Date: 04-07-2004

NOTES: Intensity = 140.36 / (Inlet time + 19.80) ^ 0.93; Return period = 10 Yrs.



SITE 31.44 AC ✓

James City County BMP Guidelines

Table 2

Worksheet for BMP Point System

A. STRUCTURAL BMP POINT ALLOCATION

BMP	BMP Points		Fraction of Site Served by BMP	Weighted BMP Points
#1 WET ED	10 ✓ OK	X	$\frac{20.90 \text{ AC}}{31.44 \text{ AC}} =$	6.65 ✓
#4 WET ED	10 ✓ OK	X	$\frac{2.05 \text{ AC}}{31.44 \text{ AC}} =$	0.65 ✓
2 CONSTRUCTED WITH WINDERMERE WAY		X	=	
		X	=	

TOTAL WEIGHTED STRUCTURAL BMP POINTS: 7.30 ✓

B. NATURAL OPEN SPACE CREDIT

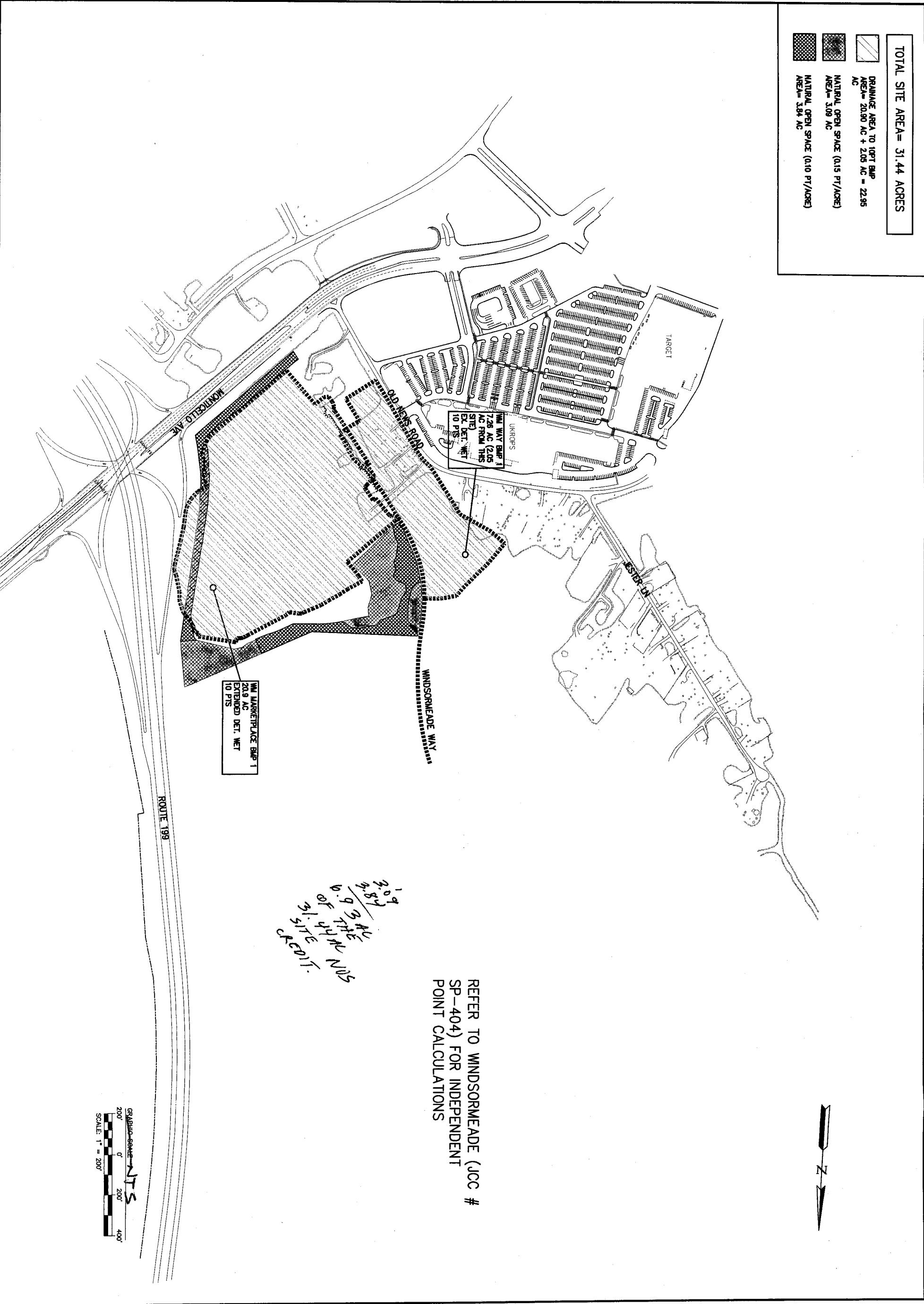
Fraction of Site	Natural Open Space Credit	Points for Natural Open Space
$\frac{3.84 \text{ AC}}{31.44 \text{ AC}} = 12.21\% \times$	0.10 ✓ (0.1 per 1%)	1.22 ✓
$\frac{3.09 \text{ AC}}{31.44 \text{ AC}} = 9.80\% \times$	0.15 ✓ (0.15 per 1%)	1.47 ✓

TOTAL NATURAL OPEN SPACE CREDIT: 2.69 ✓

C. TOTAL WEIGHTED POINTS

$$\frac{7.30 \text{ ✓}}{\text{Structural BMP Points}} + \frac{2.69 \text{ ✓}}{\text{Natural Open Space Points}} = \frac{9.99 \text{ ✓}}{\text{Total}}$$

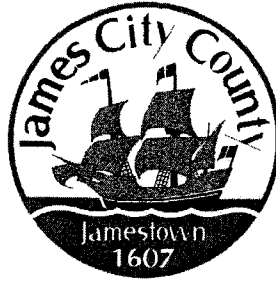
question whether 2.05 AC to the Windermere Way Road Pond was already counted.



Designed JAG		BMP POINT DISPLAY			5248 Olde Towne Road, Suite 1	
Scale 1"=200'					Williamsburg, Virginia 23188	
Drawn GVC					(757) 253-0040	
Date					Fax (757) 220-8994	
Project No.						
Drawing No.						
1 OF 1						

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pc 203

**James City County, Virginia  
Environmental Division**

**Stormwater Management / BMP Facilities  
Record Drawing and Construction Certification**

*Standard Forms & Instructions*

---

Contents

**Record Drawing and Construction Certification Forms**

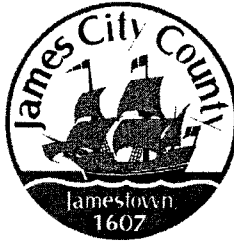
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*Issue Date  
February 1, 2001*



James City County, Virginia  
Environmental Division

Stormwater Management / BMP Facilities  
Record Drawing and Construction Certification Forms

*(Note: In accordance with the requirements of the Chesapeake Bay Preservation Ordinance, Chapter 23, Section 23-10(4), BMP's shall be designed and constructed in accordance with the manual entitled James City County Guidelines for Design and Construction of Stormwater Management BMP's. Erosion and sediment control policy and approved plans generally require that at the completion of the project and prior to release of surety, an "as-built" plan prepared by a registered Professional Engineer or Certified Land Surveyor must be provided for the drainage system for the project, including any Best Management Practice (BMP) facilities. In addition, for BMP facilities involving the construction of an impounding structure or dam embankment, certification is required by a Professional Engineer who has inspected the structure during its construction. Currently there are over 20 water quality type BMP's accepted by the County.)*

**Section 1 – Site Information:**

Project Name: WindsorMeade Market Place  
Structure/BMP Name: BMP #1  
Project Location: 4900 Monticello Ave., & WindsorMeade Way  
BMP Location: Behind Belk store  
County Plan No.: SP - 2 - 05

Project Type: ☐ Residential ☐ Business Tax Map/Parcel No.: 3831800001  
☒ Commercial ☐ Office BMP ID Code (if known): **PC 203**  
☐ Institutional ☐ Industrial Zoning District: MU (Mixed Use) w/proffers  
☐ Public ☐ Roadway Land Use: Shopping Center  
☐ Other Site Area (sf or acres): 31.44 Ac.

Brief Description of Stormwater Management/BMP Facility: Type A-3 Wet Extended Detention Pond

Nearest Visible Landmark to SWM/BMP Facility: Belk store

Nearest Vertical Ground Control (if known):

☒ JCC Geodetic Ground Control ☐ USGS ☐ Temporary ☐ Arbitrary ☐ Other

Station Number or Name: No. 322

Datum or Reference Elevation: NGVD 29

Control Description: 3-1/4" disk in concrete

Control Location from Subject Facility: SW

**Section 2 – Stormwater Management / BMP Facility Construction Information:**

PreConstruction Meeting Held for Construction of SWM/BMP Facility: ☐ Yes ☐ No ☒ Unknown  
Approx. Construction Start Date for SWM/BMP Facility: \_\_\_\_\_  
Facility Monitored by County Representative during Construction: ☐ Yes ☐ No ☒ Unknown  
Name of Site Work Contractor Who Constructed Facility: \_\_\_\_\_  
Name of Professional Firm Who Routinely Monitored Construction: \_\_\_\_\_  
Date of Completion for SWM/BMP Facility: \_\_\_\_\_  
Date of Record Drawing/Construction Certification Submittal: \_\_\_\_\_

***(Note: Record Drawing and Construction Certifications are required within thirty (30) days of the completion of Stormwater Management and/or BMP facility construction. Record Drawings and Construction Certifications must be reviewed and approved by the James City County Environmental Division prior to final inspection, acceptance and bond or surety release.)***

**Section 3 – Owner / Designer / Contractor Information:**

Owner/Developer: *(Note: Site Owner or Applicant responsible for development of the project.)*

Name: SLN Williamsburg Associates, L.L.C.  
Mailing Address: 9211 Forest Hill Ave., Suite 110  
Richmond, VA 23235  
Business Phone: 804-320-7600 Fax: 804-330-8924  
Contact Person: Jim Gresock Title: \_\_\_\_\_

Design Professional: *(Note: Professional Engineer or Certified Land Surveyor responsible for the design and preparation of plans and specifications for the Stormwater Management / BMP facility.)*

Firm Name: AES Consulting Engineers  
Mailing Address: 5248 Olde Towne Rd., Suite 1  
Williamsburg, VA 23188  
Business Phone: 757-253-0040  
Fax: 757-220-8994  
Responsible Plan Preparer: G. Archer Marston, III, P.E.  
Title: Vice President  
Plan Name: WindsorMeade Market Place  
Firm's Project No. 9069-02  
Plan Date: 12-29-06  
Sheet No.'s Applicable to SWM/BMP Facility: 1 / 9 / 18 / \_\_\_\_\_ / \_\_\_\_\_

BMP Contractor: *(Note: Site Work Contractor directly responsible for construction of the Stormwater Management / BMP facility.)*

Name: Jack L. Massie Contractor Inc.  
Mailing Address: 3900 Cokes Lane  
Williamsburg, VA 23188  
Business Phone: 757-566-8643  
Fax: 757-566-8566  
Contact Person: Scott Massie  
Site Foreman/Supervisor: Scott Massie  
Specialty Subcontractors & Purpose (for BMP Construction Only):  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Section 4 – Professional Certifications:**

Certifying Professionals: *(Note: A Registered Professional Engineer or Certified Land Surveyor is responsible for preparation of a Record Drawing, sometimes referred to as an As-Built plan, for the drainage system for the project including any Stormwater Management/BMP Facilities. A Registered Professional Engineer is responsible for the inspection, monitoring and certification of Stormwater Management / BMP facilities during its construction.)*

**Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities**

**Record Drawing Certification**

Firm Name: AES Consulting Engineers  
Mailing Address: 5248 Olde Towne Rd., Suite 1  
Williamsburg, VA 23188  
Business Phone: 757-253-0040  
Fax: 757-220-8994

Name: G. Archer Marston, III, P.E.  
Title: Vice President

Signature: \_\_\_\_\_  
Date: \_\_\_\_\_

I hereby certify to the best of my knowledge and belief that this record drawing represents the actual condition of the Stormwater Management / BMP facility. The facility appears to conform with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.

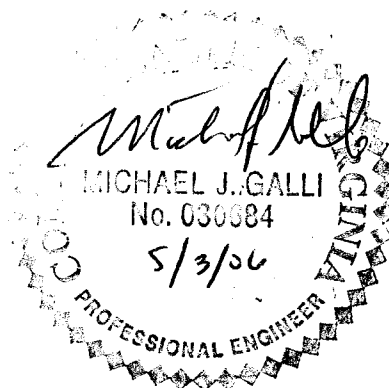
**Construction Certification**

Firm Name: ECS, Ltd.  
Mailing Address: 108 Ingram Rd., Unit 1  
Williamsburg, VA 23188  
Business Phone: 757-229-6677  
Fax: 757-229-9978

Name: Michael J. Galli, P.E.  
Title: Vice President

Signature: Michael J. Galli  
Date: 5/3/06

I hereby certify to the best of my knowledge and belief that this Stormwater Management / BMP facility was monitored and constructed in accordance with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.



\_\_\_\_\_  
(Seal)

Virginia Registered Professional Engineer  
Or Certified Land Surveyor

\_\_\_\_\_  
(Seal)

Virginia Registered  
Professional Engineer

#### Section 4 – Professional Certifications:

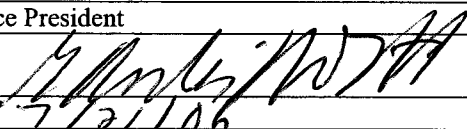
Certifying Professionals: *(Note: A Registered Professional Engineer or Certified Land Surveyor is responsible for preparation of a Record Drawing, sometimes referred to as an As-Built plan, for the drainage system for the project including any Stormwater Management/BMP Facilities. A Registered Professional Engineer is responsible for the inspection, monitoring and certification of Stormwater Management / BMP facilities during its construction.)*

#### Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

##### Record Drawing Certification

Firm Name: AES Consulting Engineers  
Mailing Address: 5248 Olde Towne Rd., Suite 1  
Williamsburg, VA 23188  
Business Phone: 757-253-0040  
Fax: 757-220-8994

Name: G. Archer Marston, III, P.E.  
Title: Vice President

Signature: 

Date: 7/21/06

I hereby certify to the best of my knowledge and belief that this record drawing represents the actual condition of the Stormwater Management / BMP facility. The facility appears to conform with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.

##### Construction Certification

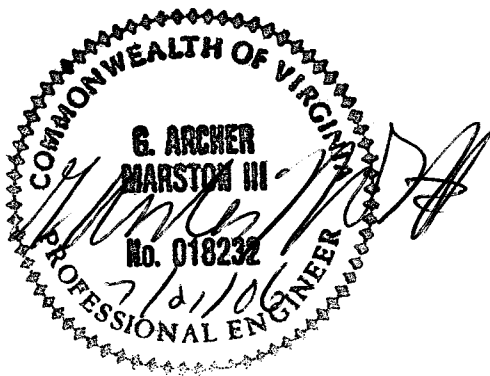
Firm Name: ECS, Ltd.  
Mailing Address: 108 Ingram Rd., Unit 1  
Williamsburg, VA 23188  
Business Phone: 757-229-6677  
Fax: 757-229-9978

Name: Michael J. Galli  
Title:

Signature:

Date:

I hereby certify to the best of my knowledge and belief that this Stormwater Management / BMP facility was monitored and constructed in accordance with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.



(Seal)

Virginia Registered Professional Engineer  
Or Certified Land Surveyor

(Seal)

Virginia Registered  
Professional Engineer

## **Section 5 – Record Drawing and Construction Certification Requirements and Instructions:**

- ❑ PreConstruction Meeting – Provides an opportunity to review SWM / BMP facility construction, maintenance and operation plans and address any questions regarding construction and/or monitoring of the structure. The design engineer, certifying professionals (if different), Owner/Applicant, Contractor and County representative(s) are encouraged to attend the preconstruction meeting. Advanced notice to the Environmental Division is requested. Usually, this requirement can be met simultaneously with Erosion and Sediment Control preconstruction meetings held for the project.
- ❑ A fully completed ***STORMWATER MANAGEMENT / BMP FACILITIES, RECORD DRAWING and CONSTRUCTION CERTIFICATION FORM and RECORD DRAWING CHECKLIST***. All applicable sections shall be completed in their entirety and certification statements signed and sealed by the registered professional responsible for individual record drawing and/or construction certification.
- ❑ The Record Drawing shall be prepared by a Registered Professional Engineer or Certified Land Surveyor for the drainage system of the project including any Best Management Practices.
- ❑ Construction Certification. Construction of Stormwater Management / BMP facilities which contain impoundments, embankments and related engineered appurtenances including subgrade preparation, compacted soils, structural fills, liners, geosynthetics, filters, seepage controls, cutoffs, toe drains, hydraulic flow control structures, etc. shall be visually observed and monitored by a Registered Professional Engineer or his/her authorized representative. The Engineer must certify that the structure, embankment and associated appurtenances were built in accordance with the approved design plan, specifications and stormwater management plan and standard accepted construction practice and shall submit a written certification and/or drawings to the Environmental Division as required. Soil and compaction test reports, concrete test reports, inspection reports, logs and other required construction material or installation documentation may be required by the Environmental Division to substantiate the certification, if specifically requested. The Engineer shall have the authority and responsibility to make minor changes to the approved plan, in coordination with the assigned County inspector, in order to compensate for unsafe or unusual conditions encountered during construction such as those related to bedrock, soils, groundwater, topography, etc. as long as changes do not adversely affect the integrity of the structure(s). Major changes to the approved design plan or structure must be reviewed and approved by the original design professional and the James City County Environmental Division.
- ❑ Record Drawing and Construction Certifications are required within **thirty (30) days** of the completion of Stormwater Management / BMP facility construction. Submittals must be reviewed and accepted by James City County Environmental Division prior to final inspection, acceptance and bond/surety release.

**Dual Purpose Facilities** – Completion of construction also includes an interim stage for Stormwater Management / BMP facilities which serve dual purpose as temporary sediment basins during construction and as permanent stormwater management / BMP facilities following construction, once development and stabilization are substantially complete. For these dual purpose facilities, construction certification is required once the temporary sediment basin phase of construction is complete. Final record drawing and construction certification of additional permanent components is required once permanent facility construction is complete.

*Interim Construction Certification* is required for those dual purpose embankment-type facilities that are generally ten (10) feet or greater in dam height (\*) and may not be converted, modified or begin function as a permanent SWM / BMP structure for a period generally ranging from six (6) to eighteen (18) months or more from issuance of a Land Disturbance permit for construction.

Interim or final record drawing and construction certifications are not required for temporary sediment basins which are designed and constructed in accordance with current minimum standards and specifications for temporary sediment basins per the Virginia Erosion and Sediment Control Handbook (VESCH); have a temporary service life of less than eighteen (18) months; and will be removed completely once associated disturbed areas are stabilized, unless a distinct hazard to the public's health, safety and welfare is determined by the Environmental Division due to the size or presence of the structure or due to evidence of improper construction.

(\*Note: Dam Height as referenced above is generally defined as the vertical distance from the natural bed of the stream or waterway at the downstream toe of the embankment to the top of the embankment structure in accordance with 4VAC50-20-30, Virginia Impoundment Structure Regulations and the Virginia Dam Safety Program.)

- ☐ Record Drawings shall provide, at a minimum, all information as shown within these requirements and the attached **RECORD DRAWING CHECKLIST** specific to the type of SWM/BMP facility being constructed. Other additional record data may be formally requested by the James City County Environmental Division. *(Note: Refer to the current edition of the James City County Guidelines for Design and Construction of Stormwater Management BMP's manual for a complete list of acceptable BMP's. Currently there are over 20 acceptable water quality type BMP's accepted by the County.)*
- ☐ Record Drawings shall consist of blue/black line prints and a reproducible (mylar, sepia, diazo, etc.) set of the approved stormwater management plan including applicable plan views, profiles, sections, details, maintenance plans, etc. as related to the subject SWM / BMP facility. The set shall indicate "**RECORD DRAWING**" in large text in the lower right hand corner of each sheet with record elevations, dimensions and data drawn in a clearly annotated format and/or boxed beside design values. Approved design plan values, dimensions and data shall not be removed or erased. Drawing sheet revision blocks shall be modified as required to indicate record drawing status. Elevations to the nearest 0.1' are sufficiently accurate except where higher accuracy is needed to show positive drainage. Certification statements as shown in Section 4 of the Record Drawing and Construction Certification Form, *or similar forms thereof*, and professional signatures and seals, with dates matching that of the record drawing status in the revision or title block, are also required on all associated record drawing plans, prints or reproducibles.
- ☐ Submission Requirements. Initial and subsequent submissions for review shall consist of a minimum of one (1) blue/black line set for record drawings and one copy of the construction certification documents with appropriate transmittal. Under certain circumstances, it is understood that the record drawing and construction certification submissions may be performed by different professional firms. Therefore, record drawing submission may be in advance of construction certification or vice versa. Upon approval and prior to release of bond/surety, final submission shall include one (1) reproducible set of the record drawings, one (1) blue/black line set of the record drawings and one (1) copy of the construction certification. Also for current and/or future incorporation into the County BMP database and GIS system, it is requested that the record drawings also be submitted to the Environmental Division on a diskette or CD-ROM in an acceptable electronic file format such as \*.dxf, \*.dwg, etc. or in a standard scanned and readable format. The electronic file requirement can be discussed and coordinated with Environmental Division staff at the time of final submission.

## STORMWATER MANAGEMENT / BMP FACILITIES RECORD DRAWING CHECKLIST

( Key for Checklist is as follows: XX Acceptable    N/A Not Applicable    Inc Incomplete)

**I.      Methods and Presentation:** *(Required for all Stormwater Management / BMP facilities.)*

- XX 1. All constructed facilities meet approved design plans, unless otherwise shown. Record information or deviations from approved design plan shown in clearly annotated format and/or boxed beside design values.
- XX 2. Elevations to the nearest 0.1' unless higher accuracy is needed to show positive drainage.
- XX 3. All plan sheets labeled with "RECORD DRAWING" in large text in lower right hand corner (Approved County Plan Number and BMP ID Code can be included if known).
- XX 4. All plans sheet revision blocks modified to indicate date and record drawing status.
- XX 5. All plan sheets have certification statements and certifying professional's signature and seal.

**II.     Minimum Standards:** *(Required for all Stormwater Management / BMP facilities, as applicable.)*

- XX 1. All requirements of Section I (Methods and Presentation) apply to this section.
- XX 2. Plan Views: Show general location, arrangement and dimensions. Location and alignment shall generally match approved design plans.
- XX 3. Profile or elevations along top or berm of the facility. At a minimum, elevations are required at each end, at intervals not to exceed 50 feet and where low spots may be present. Top of embankment or berm elevations must be no less than design elevation plus any settlement allowances.
- XX 4. Top widths, berm widths and embankment side slopes.
- XX 5. Show length, width and depth of facility or grading, contours or spot elevations as required to verify permanent pool and design storage volumes were met or were reasonably close to the approved design. Evaluation of as-built grading, contours, spot elevations, or cross-sections, may be necessary by the professional to ensure approved design configurations, depths and volumes were closely maintained. If grading or elevations are significantly different from the approved plan, the Environmental Division shall be contacted immediately to determine whether the variation is acceptable or whether further evidence will be required. Facilities which do not closely resemble approved plan grades, elevations or configurations may require regrading by the Contractor; check volumetric computations; and/or a check hydraulic routing to ensure approved design water surface elevations, discharges or freeboard were closely maintained.
- XX 6. Cross-section of the embankment through the principal spillway or outlet barrel. Must extend at least 100 ft. downstream of the pipe outlet or to recorded site property line, whichever is closer. Proper correlation is required between principal spillway (control structure) crest, emergency spillway crest, orifice and weirs and the top of the dam or facility. All elevations and dimensions must reasonably match the design plan or be sequentially relative to each other and the facility must reflect the required design storage volume(s) and/or design depth.
- XX 7. Profile or elevations along the entire centerline of the emergency spillway. Emergency spillway may be steeper, but no flatter or narrower than design.
- XX 8. Elevation of the principal spillway crest or outlet crest of the structure.



- XX 9. Primary control structure (riser) diameter or dimensions, height, type of material and base size. Indicate provisions for access that are present such as steps, ladders, etc.
- XX 10. Dimensions, locations and elevations of outlet orifices, weirs, slots and drains.
- XX 11. Type and size of anti-vortex and trash rack device. Height, diameter, dimensions, bar spacings (if applicable) and elevations relative to the principal spillway crest. Indicate if lockable hatch is present or not.
- Geotech 12. Type, location, size and number of anti-seep collars or documentation of other methods utilized for seepage control. **May need to obtain this information during construction.**
- Geotech 13. Top of impervious core embankment, core trench limits and elevation of cut-off trench bottom. **May need to obtain this information during construction.**
- XX 14. Elevation of the principal spillway barrel (outlet pipe) inlet and outlet invert.
- XX 15. Outlet barrel diameter, length, slope, type and thickness class of material and type of flared end sections, headwall or endwall.
- XX 16. Outfall protection dimension, type and depth of rock and if underlain filter fabric is present.
- XX 17. BMP interior and periphery landscaping zones conform with arrangements and requirements of the approved design plan.
- XX 18. Maintenance plan taken from approved design plan transposed onto record drawing set.
- XX 19. Fencing location and type, if applicable to facility.
- XX 20. BMP vicinity properly cleaned of stockpiles and construction debris.
- XX 21. No visual signs of erosion or channel degradation immediately downstream of facility.
- XX 22. Any other information formally requested by the Environmental Division specific to the constructed SWM/BMP facility.

## STORMWATER MANAGEMENT / BMP FACILITIES RECORD DRAWING CHECKLIST

( Key for Checklist is as follows: XX Acceptable    N/A Not Applicable    Inc Incomplete)

### III.    Group A – Wet Ponds (Includes A-1 Small Wet Ponds; A-2 Wet Ponds; A-3 Wet Ext Det Ponds.)

- XX    A1.    All requirements of Section II, Minimum Standards, apply to Group A facilities.
- XX    A2.    Principal spillway consists of ~~reinforced concrete pipe with O-Ring gaskets for watertight joint construction.~~ HDPR per approved plan.
- XX    A3.    Sediment forebays or pretreatment devices provided at inlets to pond. Generally 4 to 6 ft. deep.
- N/A    A4.    Access for maintenance and equipment is provided to the forebay(s). Access corridors are at least 12 ft. wide, have a maximum slope of 15 percent and are adequately stabilized to withstand heavy equipment or vehicle use.
- N/A    A5.    Adequate fixed vertical sediment depth markers installed in the forebay(s) for future sediment monitoring purposes.
- N/A    A6.    Pond liner (if required) provided. Either clay liners, polyliners, bentonite liners or use of chemical soil additives based on requirements of the approved plan.
- N/A    A7.    Minimum 6 percent slope safety bench extending a minimum of 15 feet outward from normal pool edge and/or an aquatic bench extending a minimum of 10 feet inward from the normal shoreline with a maximum depth of 12 inches below the normal pool elevation, if applicable, per the approved design plans. (Note: Safety benches may be waived if pond side slopes are no steeper than 4H:1V).
- XX    A8.    No trees are present within a zone 15 feet around the embankment toe and 25 feet from the principal spillway structure.
- XX    A9.    Wet permanent pool, typically 3 to 6 feet deep, is provided and maintains level within facility.
- XX    A10.    Low flow orifice has a non-clogging mechanism.
- XX    A11.    A pond drain pipe with valve was provided.
- XX    A12.    Pond side slopes are not steeper than 3H:1V, unless approved plan allowed for steeper slope.
- N/A    A13.    End walls above barrels (outlet pipe) greater than 48 inch in diameter are fenced to prevent a fall hazard.

# STORMWATER MANAGEMENT / BMP FACILITIES RECORD DRAWING CHECKLIST

( Key for Checklist is as follows: XX Acceptable    N/A Not Applicable    Inc Incomplete)

**X.      Storm Drainage Systems (Associated with BMP's Only)**

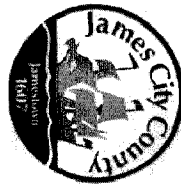
*(Includes all incidental stormwater drainage conveyance systems associated with SWM/BMP facilities such as onsite or offsite storm drains, open channels, inlets, manholes, junctions, outlet protections, deflectors, etc. These facilities are external to the treatment function of, but are directly associated with drainage to and/or from a constructed SWM/BMP facility. The intent of this portion of the certification is to accurately identify the type and quantity of inflow or outflow points associated with the facility for future reference. The Professional may use his/her own discretion to determine inclusive facilities to meet the intent of this section. As a general rule, storm drainage systems would include incidental facilities to the nearest access structure upslope or downslope from the normal physical limits of the facility or 800 feet of storm drainage conveyance system length, whichever is less.)*

- XX SD1. All requirements of Section II, Minimum Standards, apply to Storm Drainage Systems.
- XX SD2. Horizontal location of all pipe and structures relative to the SWM/BMP facility.
- XX SD3. Type, top elevation and invert elevation of all access type structures (inlets, manholes, etc.).
- XX SD4. Material type, size or diameter, class, invert elevations, lengths and slopes for all pipe segments.
- XX SD5. Class, length, width and depth of riprap and outlet protections or dimensions of special energy dissipation structures.

**XII.    Other Systems**

*(Includes any non-typical, specialty, manufactured or innovative stormwater management/BMP practices or systems generally accepted for use as or in conjunction with other acceptable stormwater management / BMP practices. Requires evidence of prior satisfactory industry use and prior Environmental Division approval, waiver or exception.)*

- NA O1. All requirements of Section II, Minimum Standards, apply to this section.
- NA O2. Certification criteria to be determined on a case-by-case basis by the Environmental Division specific to the proposed SWM/BMP facility.



**Notification of Submission of a Record  
Drawing/Construction Certification for a  
Stormwater Management BMP  
(Inspector's Review)**

Date:

09/07/06

Inspector:

☒ Joe Buchite  
☐ Mike Majdeski  
☐ Jason Beck  
☐ Tina Cooke  
Other: \_\_\_\_\_

**Project:**

**BMP Facility:**

**Plan No.:**

**Assigned County BMP ID Code:**

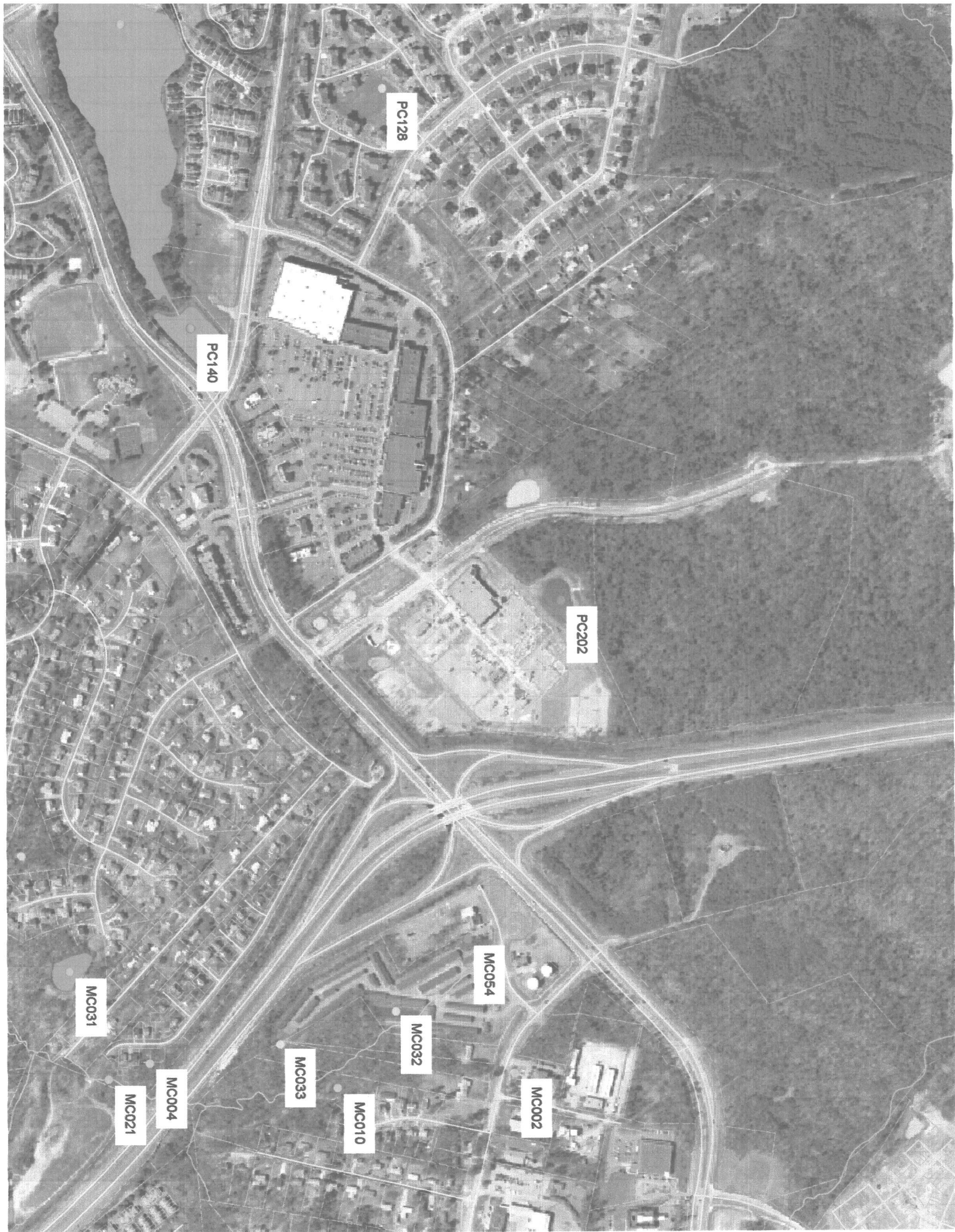
I received a transmittal for a Record Drawing and/or Construction Certification for the above referenced facility on \_\_\_\_\_. Prior to performing a full review of these certification items and a field inspection of the BMP, the information is being first forwarded to you for cursory review and input. This is a first screening to ensure the record drawing accurately portrays field observations by the Inspector and to notify the engineering group if any relevant changes were made in the field by the inspector beyond the approved site plan or this record drawing. Please review the information and return it to promptly, with any input, so the engineering group can proceed with the review of certification material.

Please note that you do not need to perform a detailed field inspection. If the asbuilts do not accurately portray what the inspector saw in the field, or if any changes were made to the plan which would affect asbuilt review, then this information needs to be relayed verbally to the engineering group. (As an example, say the riser/barrel system for the BMP was approved by the inspector to be moved from that shown on the approved design plan due to poor soil conditions. During record drawing review, this would avoid comments being generated saying that the riser/barrel is in the wrong location or needs to be moved back to where the soils were poor.)

During engineering review, we will look at issues related to the BMP and its primary inflow and outflow conveyance systems, and may make comment on the following areas: Inspection/Maintenance agreement, Record Drawings (RD), Construction Certification (CC) and Construction-Related (CR) field items as it pertains to the BMP. If you have any other related non-BMP site issues such as site erosion, stabilization, removal of erosion & sediment controls, etc. that are not related to the BMP, you must proceed with closing out these items on your own accord, or alternatively, if needed, these can be added to the BMP comment letter.

Again, only verbal response is necessary.

Shared File: Asbuilts\Admin\Final\Inspector.form



PC128

PC140

PC202

MC031

MC004

MC021

MC033

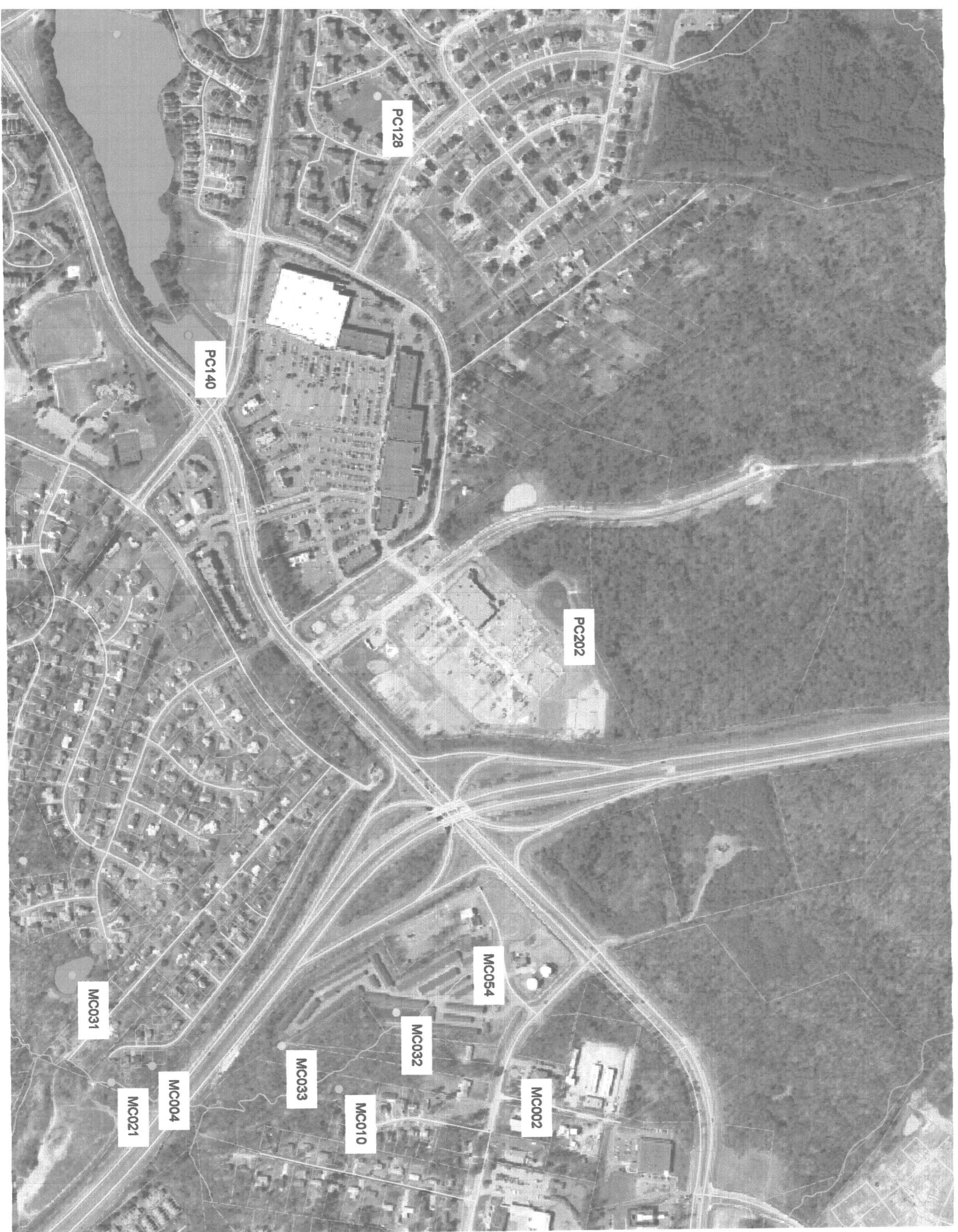
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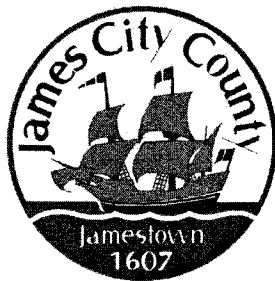
MC033

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PC 203

**James City County, Virginia  
Environmental Division**

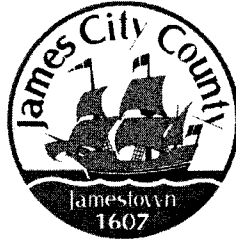
**Stormwater Management / BMP Facilities  
Record Drawing and Construction Certification**

*Standard Forms & Instructions*

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*Issue Date  
February 1, 2001*



James City County, Virginia  
Environmental Division

Stormwater Management / BMP Facilities  
Record Drawing and Construction Certification Forms

*(Note: In accordance with the requirements of the Chesapeake Bay Preservation Ordinance, Chapter 23, Section 23-10(4), BMP's shall be designed and constructed in accordance with the manual entitled James City County Guidelines for Design and Construction of Stormwater Management BMP's. Erosion and sediment control policy and approved plans generally require that at the completion of the project and prior to release of surety, an "as-built" plan prepared by a registered Professional Engineer or Certified Land Surveyor must be provided for the drainage system for the project, including any Best Management Practice (BMP) facilities. In addition, for BMP facilities involving the construction of an impounding structure or dam embankment, certification is required by a Professional Engineer who has inspected the structure during its construction. Currently there are over 20 water quality type BMP's accepted by the County.)*

**Section 1 – Site Information:**

Project Name: WindsorMeade Market Place  
Structure/BMP Name: BMP #1  
Project Location: 4900 Monticello Ave., & WindsorMeade Way  
BMP Location: Behind Belk store  
County Plan No.: SP - 2 - 05

Project Type: ☐ Residential ☐ Business ☐ Office ☐ Institutional ☐ Industrial ☐ Public ☐ Roadway ☒ Commercial

Tax Map/Parcel No.: 3831800001  
BMP ID Code (if known): PC203  
Zoning District: MU (Mixed Use) w/proffers  
Land Use: Shopping Center  
Site Area (sf or acres): 31.44 Ac.

Brief Description of Stormwater Management/BMP Facility: Type A-3 Wet Extended Detention Pond

Nearest Visible Landmark to SWM/BMP Facility: Belk store

Nearest Vertical Ground Control (if known):

☒ JCC Geodetic Ground Control ☐ USGS ☐ Temporary ☐ Arbitrary ☐ Other

Station Number or Name: No. 322

Datum or Reference Elevation: NGVD 29

Control Description: 3-1/4" disk in concrete

Control Location from Subject Facility: SW



**Section 2 – Stormwater Management / BMP Facility Construction Information:**

PreConstruction Meeting Held for Construction of SWM/BMP Facility: ☐ Yes ☐ No ☒ Unknown  
Approx. Construction Start Date for SWM/BMP Facility: \_\_\_\_\_  
Facility Monitored by County Representative during Construction: ☐ Yes ☐ No ☒ Unknown  
Name of Site Work Contractor Who Constructed Facility: \_\_\_\_\_  
Name of Professional Firm Who Routinely Monitored Construction: \_\_\_\_\_  
Date of Completion for SWM/BMP Facility: \_\_\_\_\_  
Date of Record Drawing/Construction Certification Submittal: \_\_\_\_\_

***(Note: Record Drawing and Construction Certifications are required within thirty (30) days of the completion of Stormwater Management and/or BMP facility construction. Record Drawings and Construction Certifications must be reviewed and approved by the James City County Environmental Division prior to final inspection, acceptance and bond or surety release.)***

**Section 3 – Owner / Designer / Contractor Information:**

Owner/Developer: *(Note: Site Owner or Applicant responsible for development of the project.)*

Name: SLN Williamsburg Associates, L.L.C.  
Mailing Address: 9211 Forest Hill Ave., Suite 110  
Richmond, VA 23235  
Business Phone: 804-320-7600 Fax: 804-330-8924  
Contact Person: Jim Gresock Title: \_\_\_\_\_

Design Professional: *(Note: Professional Engineer or Certified Land Surveyor responsible for the design and preparation of plans and specifications for the Stormwater Management / BMP facility.)*

Firm Name: AES Consulting Engineers  
Mailing Address: 5248 Olde Towne Rd., Suite 1  
Williamsburg, VA 23188  
Business Phone: 757-253-0040  
Fax: 757-220-8994  
Responsible Plan Preparer: G. Archer Marston, III, P.E.  
Title: Vice President  
Plan Name: WindsorMeade Market Place  
Firm's Project No. 9069-02  
Plan Date: 12-29-06  
Sheet No.'s Applicable to SWM/BMP Facility: 1 / 9 / 18 / \_\_\_\_\_ / \_\_\_\_\_

BMP Contractor: *(Note: Site Work Contractor directly responsible for construction of the Stormwater Management / BMP facility.)*

Name: Jack L. Massie Contractor Inc.  
Mailing Address: 3900 Cokes Lane  
Williamsburg, VA 23188  
Business Phone: 757-566-8643  
Fax: 757-566-8566  
Contact Person: Scott Massie  
Site Foreman/Supervisor: Scott Massie  
Specialty Subcontractors & Purpose (for BMP Construction Only):  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Section 4 – Professional Certifications:**

**Certifying Professionals:** *(Note: A Registered Professional Engineer or Certified Land Surveyor is responsible for preparation of a Record Drawing, sometimes referred to as an As-Built plan, for the drainage system for the project including any Stormwater Management/BMP Facilities. A Registered Professional Engineer is responsible for the inspection, monitoring and certification of Stormwater Management / BMP facilities during its construction.)*

**Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities**

**Record Drawing Certification**

Firm Name: AES Consulting Engineers  
Mailing Address: 5248 Olde Towne Rd., Suite 1  
Williamsburg, VA 23188  
Business Phone: 757-253-0040  
Fax: 757-220-8994

Name: G. Archer Marston, III, P.E.  
Title: Vice President

Signature: \_\_\_\_\_  
Date: \_\_\_\_\_

I hereby certify to the best of my knowledge and belief that this record drawing represents the actual condition of the Stormwater Management / BMP facility. The facility appears to conform with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.

**Construction Certification**

Firm Name: ECS, Ltd.  
Mailing Address: 108 Ingram Rd., Unit 1  
Williamsburg, VA 23188  
Business Phone: 757-229-6677  
Fax: 757-229-9978

Name: Michael J. Galli, P.E.  
Title: Vice President

Signature: Michael J. Galli  
Date: 5/3/06

I hereby certify to the best of my knowledge and belief that this Stormwater Management / BMP facility was monitored and constructed in accordance with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.



\_\_\_\_\_  
(Seal)

Virginia Registered Professional Engineer  
Or Certified Land Surveyor

\_\_\_\_\_  
(Seal)

Virginia Registered  
Professional Engineer

**Section 4 – Professional Certifications:**

Certifying Professionals: *(Note: A Registered Professional Engineer of Certified Land Surveyor is responsible for preparation of a Record Drawing, sometimes referred to as an As-Built plan, for the drainage system for the project including any Stormwater Management/BMP Facilities. A Registered Professional Engineer is responsible for the inspection, monitoring and certification of Stormwater Management / BMP facilities during its construction.)*

**Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities**

**Record Drawing Certification**

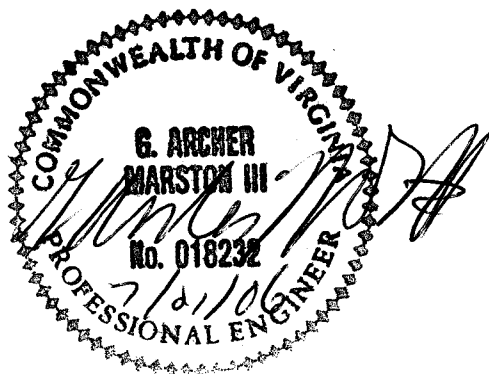
Firm Name: AES Consulting Engineers  
Mailing Address: 5248 Olde Towne Rd., Suite 1  
Williamsburg, VA 23188  
Business Phone: 757-253-0040  
Fax: 757-220-8994

Name: G. Archer Marston, III, P.E.  
Title: Vice President

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

I hereby certify to the best of my knowledge and belief that this record drawing represents the actual condition of the Stormwater Management / BMP facility. The facility appears to conform with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.



\_\_\_\_\_  
(Seal)

Virginia Registered Professional Engineer  
Or Certified Land Surveyor

**Construction Certification**

Firm Name: ECS, Ltd.  
Mailing Address: 108 Ingram Rd., Unit 1  
Williamsburg, VA 23188  
Business Phone: 757-229-6677  
Fax: 757-229-9978

Name: Michael J. Galli  
Title: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

I hereby certify to the best of my knowledge and belief that this Stormwater Management / BMP facility was monitored and constructed in accordance with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.

\_\_\_\_\_  
(Seal)

Virginia Registered  
Professional Engineer

## **Section 5 – Record Drawing and Construction Certification Requirements and Instructions:**

- ❑ PreConstruction Meeting – Provides an opportunity to review SWM / BMP facility construction, maintenance and operation plans and address any questions regarding construction and/or monitoring of the structure. The design engineer, certifying professionals (if different), Owner/Applicant, Contractor and County representative(s) are encouraged to attend the preconstruction meeting. Advanced notice to the Environmental Division is requested. Usually, this requirement can be met simultaneously with Erosion and Sediment Control preconstruction meetings held for the project.
- ❑ A fully completed ***STORMWATER MANAGEMENT / BMP FACILITIES, RECORD DRAWING and CONSTRUCTION CERTIFICATION FORM and RECORD DRAWING CHECKLIST***. All applicable sections shall be completed in their entirety and certification statements signed and sealed by the registered professional responsible for individual record drawing and/or construction certification.
- ❑ The Record Drawing shall be prepared by a Registered Professional Engineer or Certified Land Surveyor for the drainage system of the project including any Best Management Practices.
- ❑ Construction Certification. Construction of Stormwater Management / BMP facilities which contain impoundments, embankments and related engineered appurtenances including subgrade preparation, compacted soils, structural fills, liners, geosynthetics, filters, seepage controls, cutoffs, toe drains, hydraulic flow control structures, etc. shall be visually observed and monitored by a Registered Professional Engineer or his/her authorized representative. The Engineer must certify that the structure, embankment and associated appurtenances were built in accordance with the approved design plan, specifications and stormwater management plan and standard accepted construction practice and shall submit a written certification and/or drawings to the Environmental Division as required. Soil and compaction test reports, concrete test reports, inspection reports, logs and other required construction material or installation documentation may be required by the Environmental Division to substantiate the certification, if specifically requested. The Engineer shall have the authority and responsibility to make minor changes to the approved plan, in coordination with the assigned County inspector, in order to compensate for unsafe or unusual conditions encountered during construction such as those related to bedrock, soils, groundwater, topography, etc. as long as changes do not adversely affect the integrity of the structure(s). Major changes to the approved design plan or structure must be reviewed and approved by the original design professional and the James City County Environmental Division.
- ❑ Record Drawing and Construction Certifications are required within **thirty (30) days** of the completion of Stormwater Management / BMP facility construction. Submittals must be reviewed and accepted by James City County Environmental Division prior to final inspection, acceptance and bond/surety release.

**Dual Purpose Facilities** – Completion of construction also includes an interim stage for Stormwater Management / BMP facilities which serve dual purpose as temporary sediment basins during construction and as permanent stormwater management / BMP facilities following construction, once development and stabilization are substantially complete. For these dual purpose facilities, construction certification is required once the temporary sediment basin phase of construction is complete. Final record drawing and construction certification of additional permanent components is required once permanent facility construction is complete.

*Interim Construction Certification* is required for those dual purpose embankment-type facilities that are generally ten (10) feet or greater in dam height (\*) and may not be converted, modified or begin function as a permanent SWM / BMP structure for a period generally ranging from six (6) to eighteen (18) months or more from issuance of a Land Disturbance permit for construction.

Interim or final record drawing and construction certifications are not required for temporary sediment basins which are designed and constructed in accordance with current minimum standards and specifications for temporary sediment basins per the Virginia Erosion and Sediment Control Handbook (VESCH); have a temporary service life of less than eighteen (18) months; and will be removed completely once associated disturbed areas are stabilized, unless a distinct hazard to the public's health, safety and welfare is determined by the Environmental Division due to the size or presence of the structure or due to evidence of improper construction.

(\*Note: Dam Height as referenced above is generally defined as the vertical distance from the natural bed of the stream or waterway at the downstream toe of the embankment to the top of the embankment structure in accordance with 4VAC50-20-30, Virginia Impoundment Structure Regulations and the Virginia Dam Safety Program.)

- ❑ Record Drawings shall provide, at a minimum, all information as shown within these requirements and the attached **RECORD DRAWING CHECKLIST** specific to the type of SWM/BMP facility being constructed. Other additional record data may be formally requested by the James City County Environmental Division. *(Note: Refer to the current edition of the James City County Guidelines for Design and Construction of Stormwater Management BMP's manual for a complete list of acceptable BMP's. Currently there are over 20 acceptable water quality type BMP's accepted by the County.)*
- ❑ Record Drawings shall consist of blue/black line prints and a reproducible (mylar, sepia, diazo, etc.) set of the approved stormwater management plan including applicable plan views, profiles, sections, details, maintenance plans, etc. as related to the subject SWM / BMP facility. The set shall indicate "**RECORD DRAWING**" in large text in the lower right hand corner of each sheet with record elevations, dimensions and data drawn in a clearly annotated format and/or boxed beside design values. Approved design plan values, dimensions and data shall not be removed or erased. Drawing sheet revision blocks shall be modified as required to indicate record drawing status. Elevations to the nearest 0.1' are sufficiently accurate except where higher accuracy is needed to show positive drainage. Certification statements as shown in Section 4 of the Record Drawing and Construction Certification Form, *or similar forms thereof*, and professional signatures and seals, with dates matching that of the record drawing status in the revision or title block, are also required on all associated record drawing plans, prints or reproducibles.
- ❑ Submission Requirements. Initial and subsequent submissions for review shall consist of a minimum of one (1) blue/black line set for record drawings and one copy of the construction certification documents with appropriate transmittal. Under certain circumstances, it is understood that the record drawing and construction certification submissions may be performed by different professional firms. Therefore, record drawing submission may be in advance of construction certification or vice versa. Upon approval and prior to release of bond/surety, final submission shall include one (1) reproducible set of the record drawings, one (1) blue/black line set of the record drawings and one (1) copy of the construction certification. Also for current and/or future incorporation into the County BMP database and GIS system, it is requested that the record drawings also be submitted to the Environmental Division on a diskette or CD-ROM in an acceptable electronic file format such as \*.dxf, \*.dwg, etc. or in a standard scanned and readable format. The electronic file requirement can be discussed and coordinated with Environmental Division staff at the time of final submission.

## STORMWATER MANAGEMENT / BMP FACILITIES RECORD DRAWING CHECKLIST

( Key for Checklist is as follows: XX Acceptable    N/A Not Applicable    Inc Incomplete)

**I.        Methods and Presentation:** *(Required for all Stormwater Management / BMP facilities.)*

- XX 1. All constructed facilities meet approved design plans, unless otherwise shown. Record information or deviations from approved design plan shown in clearly annotated format and/or boxed beside design values.
- XX 2. Elevations to the nearest 0.1' unless higher accuracy is needed to show positive drainage.
- XX 3. All plan sheets labeled with "RECORD DRAWING" in large text in lower right hand corner (Approved County Plan Number and BMP ID Code can be included if known).
- XX 4. All plans sheet revision blocks modified to indicate date and record drawing status.
- XX 5. All plan sheets have certification statements and certifying professional's signature and seal.

**II.       Minimum Standards:** *(Required for all Stormwater Management / BMP facilities, as applicable.)*

- XX 1. All requirements of Section I (Methods and Presentation) apply to this section.
- XX 2. Plan Views: Show general location, arrangement and dimensions. Location and alignment shall generally match approved design plans.
- XX 3. Profile or elevations along top or berm of the facility. At a minimum, elevations are required at each end, at intervals not to exceed 50 feet and where low spots may be present. Top of embankment or berm elevations must be no less than design elevation plus any settlement allowances.
- XX 4. Top widths, berm widths and embankment side slopes.
- XX 5. Show length, width and depth of facility or grading, contours or spot elevations as required to verify permanent pool and design storage volumes were met or were reasonably close to the approved design. Evaluation of as-built grading, contours, spot elevations, or cross-sections, may be necessary by the professional to ensure approved design configurations, depths and volumes were closely maintained. If grading or elevations are significantly different from the approved plan, the Environmental Division shall be contacted immediately to determine whether the variation is acceptable or whether further evidence will be required. Facilities which do not closely resemble approved plan grades, elevations or configurations may require regrading by the Contractor; check volumetric computations; and/or a check hydraulic routing to ensure approved design water surface elevations, discharges or freeboard were closely maintained.
- XX 6. Cross-section of the embankment through the principal spillway or outlet barrel. Must extend at least 100 ft. downstream of the pipe outlet or to recorded site property line, whichever is closer. Proper correlation is required between principal spillway (control structure) crest, emergency spillway crest, orifice and weirs and the top of the dam or facility. All elevations and dimensions must reasonably match the design plan or be sequentially relative to each other and the facility must reflect the required design storage volume(s) and/or design depth.
- XX 7. Profile or elevations along the entire centerline of the emergency spillway. Emergency spillway may be steeper, but no flatter or narrower than design.
- XX 8. Elevation of the principal spillway crest or outlet crest of the structure.

- XX 9. Primary control structure (riser) diameter or dimensions, height, type of material and base size. Indicate provisions for access that are present such as steps, ladders, etc.
- XX 10. Dimensions, locations and elevations of outlet orifices, weirs, slots and drains.
- XX 11. Type and size of anti-vortex and trash rack device. Height, diameter, dimensions, bar spacings (if applicable) and elevations relative to the principal spillway crest. Indicate if lockable hatch is present or not.
- Geotek 12. Type, location, size and number of anti-seep collars or documentation of other methods utilized for seepage control. **May need to obtain this information during construction.**
- Geotek 13. Top of impervious core embankment, core trench limits and elevation of cut-off trench bottom. **May need to obtain this information during construction.**
- XX 14. Elevation of the principal spillway barrel (outlet pipe) inlet and outlet invert.
- XX 15. Outlet barrel diameter, length, slope, type and thickness class of material and type of flared end sections, headwall or endwall.
- XX 16. Outfall protection dimension, type and depth of rock and if underlain filter fabric is present.
- XX 17. BMP interior and periphery landscaping zones conform with arrangements and requirements of the approved design plan.
- XX 18. Maintenance plan taken from approved design plan transposed onto record drawing set.
- XX 19. Fencing location and type, if applicable to facility.
- XX 20. BMP vicinity properly cleaned of stockpiles and construction debris.
- XX 21. No visual signs of erosion or channel degradation immediately downstream of facility.
- XX 22. Any other information formally requested by the Environmental Division specific to the constructed SWM/BMP facility.

# STORMWATER MANAGEMENT / BMP FACILITIES RECORD DRAWING CHECKLIST

( Key for Checklist is as follows: XX Acceptable    N/A Not Applicable    Inc Incomplete)

## III.      Group A – Wet Ponds (Includes A-1 Small Wet Ponds; A-2 Wet Ponds; A-3 Wet Ext Det Ponds.)

- |            |      |  |
|------------|------|--|
| <u>XX</u>  | A1.  | All requirements of Section II, Minimum Standards, apply to Group A facilities.  |
| <u>XX</u>  | A2.  | Principal spillway consists of <del>reinforced concrete pipe with O-Ring gaskets for watertight joint construction.</del> HDPR per approved plan.  |
| <u>XX</u>  | A3.  | Sediment forebays or pretreatment devices provided at inlets to pond. Generally 4 to 6 ft. deep.   |
| <u>NA</u>  | A4.  | Access for maintenance and equipment is provided to the forebay(s). Access corridors are at least 12 ft. wide, have a maximum slope of 15 percent and are adequately stabilized to withstand heavy equipment or vehicle use.   |
| <u>N/A</u> | A5.  | Adequate fixed vertical sediment depth markers installed in the forebay(s) for future sediment monitoring purposes.  |
| <u>N/A</u> | A6.  | Pond liner (if required) provided. Either clay liners, polyliners, bentonite liners or use of chemical soil additives based on requirements of the approved plan.  |
| <u>N/A</u> | A7.  | Minimum 6 percent slope safety bench extending a minimum of 15 feet outward from normal pool edge and/or an aquatic bench extending a minimum of 10 feet inward from the normal shoreline with a maximum depth of 12 inches below the normal pool elevation, if applicable, per the approved design plans. (Note: Safety benches may be waived if pond side slopes are no steeper than 4H:1V). |
| <u>XX</u>  | A8.  | No trees are present within a zone 15 feet around the embankment toe and 25 feet from the principal spillway structure.  |
| <u>XX</u>  | A9.  | Wet permanent pool, typically 3 to 6 feet deep, is provided and maintains level within facility.   |
| <u>XX</u>  | A10. | Low flow orifice has a non-clogging mechanism.   |
| <u>XX</u>  | A11. | A pond drain pipe with valve was provided.   |
| <u>XX</u>  | A12. | Pond side slopes are not steeper than 3H:1V, unless approved plan allowed for steeper slope.   |
| <u>N/A</u> | A13. | End walls above barrels (outlet pipe) greater than 48 inch in diameter are fenced to prevent a fall hazard.  |



# STORMWATER MANAGEMENT / BMP FACILITIES RECORD DRAWING CHECKLIST

( Key for Checklist is as follows: XX Acceptable    N/A Not Applicable    Inc Incomplete)

**X.      Storm Drainage Systems (Associated with BMP's Only)**

*(Includes all incidental stormwater drainage conveyance systems associated with SWM/BMP facilities such as onsite or offsite storm drains, open channels, inlets, manholes, junctions, outlet protections, deflectors, etc. These facilities are external to the treatment function of, but are directly associated with drainage to and/or from a constructed SWM/BMP facility. The intent of this portion of the certification is to accurately identify the type and quantity of inflow or outflow points associated with the facility for future reference. The Professional may use his/her own discretion to determine inclusive facilities to meet the intent of this section. As a general rule, storm drainage systems would include incidental facilities to the nearest access structure upslope or downslope from the normal physical limits of the facility or 800 feet of storm drainage conveyance system length, whichever is less.)*

- XX SD1. All requirements of Section II, Minimum Standards, apply to Storm Drainage Systems.
- XX SD2. Horizontal location of all pipe and structures relative to the SWM/BMP facility.
- XX SD3. Type, top elevation and invert elevation of all access type structures (inlets, manholes, etc.).
- XX SD4. Material type, size or diameter, class, invert elevations, lengths and slopes for all pipe segments.
- XX SD5. Class, length, width and depth of riprap and outlet protections or dimensions of special energy dissipation structures.

**XII.    Other Systems**

*(Includes any non-typical, specialty, manufactured or innovative stormwater management/BMP practices or systems generally accepted for use as or in conjunction with other acceptable stormwater management / BMP practices. Requires evidence of prior satisfactory industry use and prior Environmental Division approval, waiver or exception.)*

- N/A O1. All requirements of Section II, Minimum Standards, apply to this section.
- N/A O2. Certification criteria to be determined on a case-by-case basis by the Environmental Division specific to the proposed SWM/BMP facility.

**AES CONSULTING ENGINEERS**  
Engineering, Surveying, and Planning  
5248 Olde Towne Road, Suite 1  
WILLIAMSBURG, VIRGINIA 23188

Phone: (757) 253-0040  
Fax: (757) 220-8994

# LETTER OF TRANSMITTAL

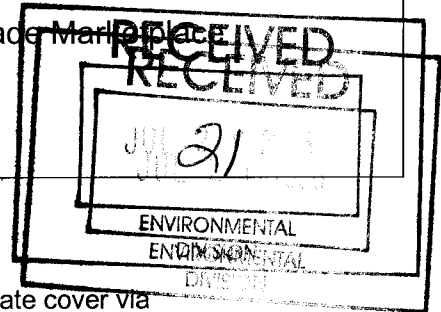
ATTN: **Scott Thomas**

CO.: James City County Env.

Address: 101-E Mounts Bay Rd.  
Williamsburg, VA 23185

cc:

DATE 7/21/06	JOB NO. 9069-02
FROM: Gwen Schatzman	
RE Windsor Meade Marsh Project	



WE ARE SENDING YOU THE FOLLOWING ITEMS:

- ☐ Attached  
☐ Under separate cover via

- ☒ Original(s)   ☒ Print(s)   ☐ Plan(s)   ☐ Specification(s)   ☐ Change Order  
☐ Copy of letter(s)   ☐ Other:

COPIES	DATE	No. of Pages	DESCRIPTION
2 2	4/28/05	3	Record Drawings for BMP BMP Certification

THESE ARE TRANSMITTED as checked below:

- ☐ For your approval   ☐ For your signature   ☐ For review and comment  
☐ For your use   ☐ As you requested   ☐ As requested by:  
☐ Other:

REMARKS:

SP-150-03  
SP-00 2-05 Amend #1  
PC 203

*If enclosures are not as noted, kindly notify us at once.*

# WindsorMeade Market Place

## BMP RECORD DRAWINGS

### LEGEND

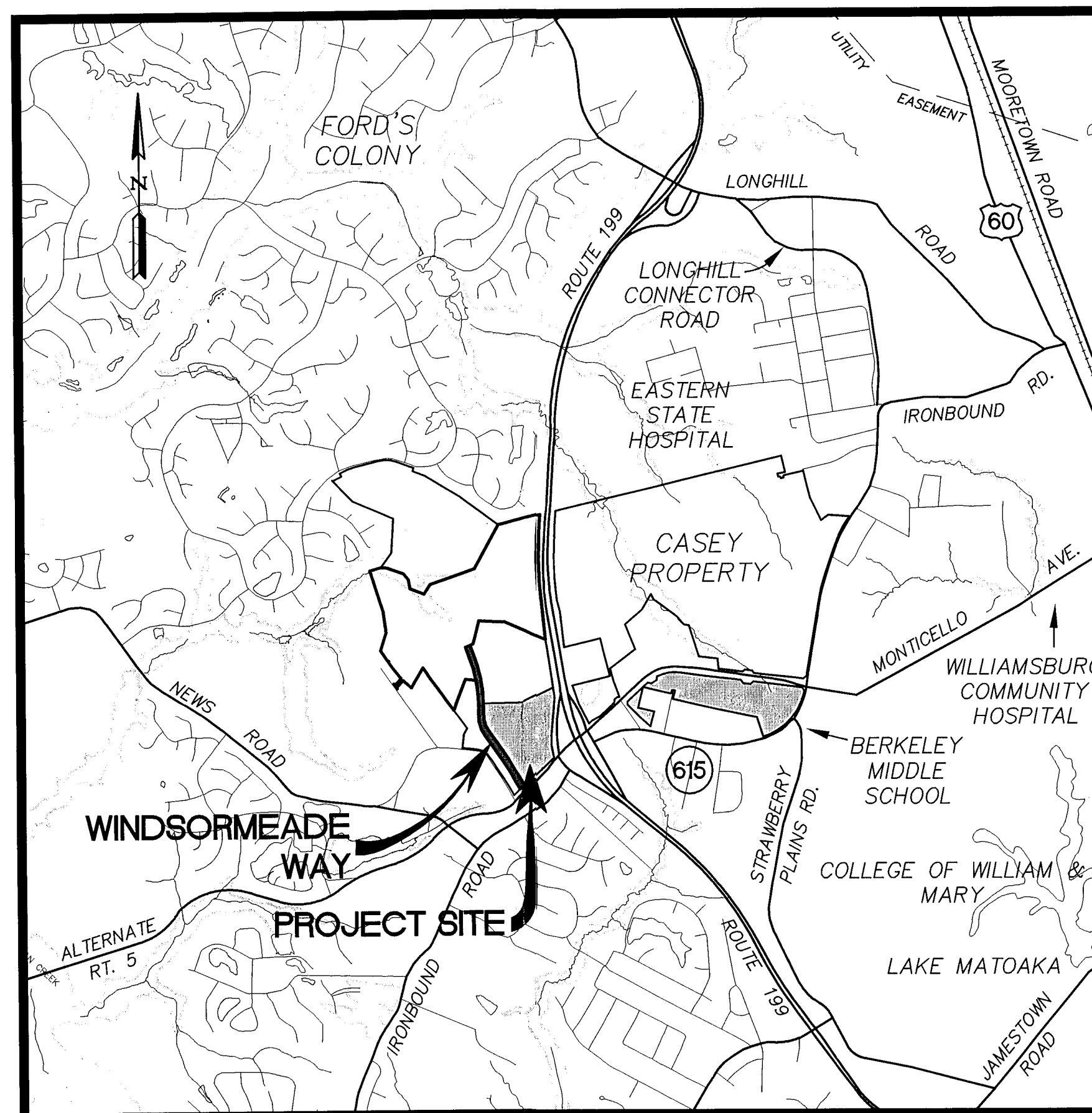
EXISTING	PROPOSED	PROPOSED
WATER	W	BLOW-OFF ASSEMBLY
GRAVITY SEWER	S	CLEAN OUT
GRAVITY SEWER (BY OTHERS)	S	WATER METER
STORM SEWER	S	CENTERLINE/BASELINE
FORCE MAIN	F.M.	RIGHT OF WAY
MANHOLE	M	PROPERTY LINE
CURB DROP INLET	C	DITCH/SWALE
YARD DROP INLET	Y	TREELINE
VALVE	V	GROUND ELEVATION
FIRE HYDRANT ASSEMBLY	H	EXISTING CONTOUR ELEV.

### NOTES:

- THE SITE IS CURRENTLY ZONED MIXED USE WITH PROFFERS. FOR PROFFERS REFERENCE JCC CASE NO. Z-03-01 AND MP-02-97 AND CASE NO. Z-05-03 AND MP-06-03 APPROVED BY THE BOARD OF SUPERVISORS ON DECEMBER 11, 2001.
- CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING 'MISS UTILITY' FOR EXISTING UTILITY LOCATIONS PRIOR TO COMMENCING CONSTRUCTION.
- CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF CONSTRUCTION EFFORTS WITH THE VIRGINIA POWER COMPANY, VERIZON TELEPHONE, APPROPRIATE CABLE COMPANY AND OTHERS THAT MAY BE REQUIRED.
- THE CONTRACTOR SHALL SATISFY HIMSELF AS TO ALL SITE CONDITIONS PRIOR TO CONSTRUCTION.
- THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS PRIOR TO COMMENCEMENT OF WORK TO INCLUDE, BUT NOT LIMITED TO, JAMES CITY COUNTY LAND DISTURBANCE, VDOT LAND USE PERMIT, AND ANY DEMOLITION PERMITS.
- EXISTING UTILITY LOCATIONS INDICATED ARE APPROXIMATE. FIELD VERIFY PRIOR TO COMMENCING THE WORK.
- ALL UTILITIES WILL BE PLACED UNDERGROUND.
- JCSA SHALL BE GRANTED ACCESS EASEMENTS TO WATER AND SEWER LOCATED WITHIN PRIVATE RIGHT-OF-WAYS.
- A PRECONSTRUCTION CONFERENCE SHALL BE HELD ON-SITE BETWEEN THE COUNTY, THE PROJECT ENGINEERS AND THE CONTRACTOR PRIOR TO ISSUANCE OF A LAND DISTURBING PERMIT.
- ALL SANITARY SEWER AND WATER DISTRIBUTION FACILITIES MUST HAVE A MINIMUM HORIZONTAL SEPARATION DISTANCE OF 5' BETWEEN IT AND ALL OTHER FIXED STRUCTURES SUCH AS: DROP INLETS, LIGHT POLES, STORM SEWER PIPES, ETC.
- THE CONTRACTOR IS REQUIRED TO SECURE ALL NECESSARY PERMITS FOR THE ABANDONMENT OR DEMOLITION OF ALL EXISTING WELLS/WATERLINES AND SEPTIC FIELDS IN ACCORDANCE WITH JAMES CITY COUNTY VIRGINIA DEPARTMENT OF HEALTH REGULATIONS. CONTACT VIRGINIA DEPARTMENT OF HEALTH AT 757-253-4813.
- VERIFY ALL DIMENSIONS AND NOTIFY JAMES CITY SERVICE AUTHORITY PRIOR TO ANY EXCAVATION OR DEMOLITION WITHIN UTILITY CORRIDORS.
- PARKING SPACES SHALL BE DELINEATED BY PAVEMENT STRIPING. HANDICAP PARKING. SPACES SHALL BE DESIGNATED BY ABOVE GROUND SIGNS PER USBC REQUIREMENTS.
- THE TOPOGRAPHIC DATA REPRESENTED ON THIS DRAWING IS SUPPLIED BY OWNER/DEVELOPER. CONTOUR INTERVAL = 2 FEET.
- ALL SECURITY LIGHTING IS TO BE LOCATED A MINIMUM OF 10' OFF THE EDGE OF PAVEMENT AND SHALL NOTE BE POSITIONED IN DITCH LINES.
- ALL COMPONENTS OF THE WATER DISTRIBUTION AND SANITARY SEWER SYSTEM SHALL BE INSTALLED AND TESTED IN ACCORDANCE WITH THE LATEST EDITION OF THE AUTHORITY STANDARDS AND SPECIFICATIONS FOR WATER DISTRIBUTION AND SANITARY SEWER SYSTEMS, THE HRPDC REGIONAL STANDARDS, AND THE COMMONWEALTH OF VIRGINIA WATERWORKS AND SEWERAGE REGULATIONS. THE CONTRACTOR SHALL USE ONLY NEW MATERIALS, PARTS AND PRODUCTS ON ALL PROJECTS. ALL MATERIALS SHALL BE STORED SO AS TO ASSURE THE PRESERVATION OF THEIR QUALITY AND FITNESS FOR THE WORK. A COPY OF THE JCSA STANDARDS AND REGIONAL STANDARDS MUST BE KEPT ON-SITE BY THE CONTRACTOR DURING THE FULL TIME OF INSTALLING, TESTING, AND CONVEYING THE FACILITIES TO JCSA.
- STORM STRUCTURES, SEWER AND BEDDING SHALL CONFORM TO THE VDOT ROAD AND BRIDGE STANDARDS AND VDOT SPECIFICATIONS. ALL PIPE BEDDING SHALL BE IN ACCORDANCE WITH PB-1 AND MANUFACTURER SPECS. AND GUIDELINES, AND MANHOLES DEEPER THAN 4 FEET SHALL HAVE STEPS (ST-1). ALL REINFORCED CONCRETE PIPE (RCP) SHALL BE CLASS III UNLESS OTHERWISE NOTED. STORM SEWER OUTSIDE OF VDOT R.O.W. CAN BE HIGH DENSITY POLYETHYLENE (HDPE).
- ALL EXISTING STRUCTURES LOCATED ON THE SITE ARE TO BE DEMOLISHED AND WILL REQUIRE A DEMOLITION PERMIT. THIS PERMIT CAN BE ACQUIRED FROM THE JAMES CITY COUNTY CODE COMPLIANCE DEPARTMENT TELEPHONE NUMBER: 757-253- 6626.
- NO TREES, SHRUBS, FENCES OR OBSTACLES SHALL BE PLACED WITHIN A JCSA EASEMENT WHICH WOULD RENDER THE EASEMENT INACCESSIBLE BY EQUIPMENT. SHRUBS SHALL BE A MINIMUM OF 5 FEET, AND TREES A MINIMUM OF 10 FEET, FROM THE CENTER OF WATER AND SEWER PIPELINES.
- CONTACT MR. SAL SIBILIA 72 HOURS IN ADVANCE OF ALL PAVEMENT MARKINGS/SIGN INSTALLATIONS AT (757) 925-1679.
- ALL SIGNAGE SHALL BE IN ACCORDANCE WITH ARTICLE II, DIVISION 3 OF THE JAMES CITY COUNTY ZONING ORDINANCE.
- OUTSIDE SALES AND STORAGE OF MERCHANDISE IS PROHIBITED.
- HVAC EQUIPMENT AND OTHER UTILITIES, DOWNSPOUTS, AND GUTTERS SHALL BE PAINTED TO MATCH THE EXTERIOR COLOR OF THE BUILDING SURFACE MATERIAL COLOR. BASES OF THE LIGHT POLES SHOULD BE PAINTED TO MATCH THE COLOR OF THE POLES.
- ONLY JCSA PERSONNEL ARE AUTHORIZED TO OPERATE VALVES ON EISTING JCSA WATER MAIN.
- WATER METERS MUST BE LOCATED A MINIMUM OF 2' FROM SIDEWALKS AND BACK OF CURBS AND 18" FROM EDGE OF DRIVEWAYS.
- THE OWNER SHALL IMPLEMENT AN ANNUAL PERFORMANCE EVALUATION/INSPECTION OF THE BACKFLOW PREVENTION DEVICE AND COORDINATE WITH JOHN WILSON, JCSA UTILITY SPECIAL COORDINATOR, AT (757) 259-4138. THE BACKFLOW PREVENTER SHALL BE TESTED, MAINTAINED, AND OPERATED IN ACCORDANCE WITH JCSA STANDARDS.

JCC# SP-2-05  
AMENDMENT TO JCC# SP-150-03

JAMES CITY COUNTY, VIRGINIA



VICINITY MAP  
SCALE: 1"=2000'

DECEMBER 29, 2003

PROJECT NO.: 9069-02

SITE PLAN AMENDMENT: 1-12-05

"THE SANITARY SEWER, WATER, AND DRAINAGE STRUCTURE LOCATIONS AND GRADES SHOWN ON THESE DRAWINGS, ARE ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF AND I CERTIFY THAT I, OR MY AGENT, HAVE MADE SUFFICIENT INSPECTION TO ENSURE THE ACCURACY OF THIS STATEMENT."

ARCHER G. MARSTON III

DATE



CONSULTING ENGINEERS  
WILLIAMSBURG • RICHMOND

5248 Olde Towne Road, Suite 1  
Williamsburg, Virginia 23188  
(757) 253-0040  
Fax (757) 220-8994

### SITE PLAN AMENDMENT (AMENDMENT TO SP #150-03, APPROVED NOVEMBER 12, 2004)

THE FOLLOWING IS A DESCRIPTION OF THE REVISIONS MADE TO THE PLAN UNDER THE SITE PLAN AMENDMENT AND THE RESUBMITTAL ADDRESSING COUNTY COMMENTS:

- REVISED FOOTPRINT OF BUILDING #5. ADDED A SANITARY LATERAL FOR THIS BUILDING. REVISED RELATIVE "REQUIRED" PARKING COUNTS. GRADING IN THIS AREA WAS ADJUSTED TO ACCOMMODATE NEW FOOTPRINT (FIRST SUBMITTAL.) ADJUSTED 10" LOADING DOCK OUTFALL ON PLANS AND ON WATERLINE PROFILE "D" AND SANITARY PROFILE MH#7 TO MH#3 (SECOND SUBMITTAL.)
- ADDED DUMPSTER SOUTH OF BUILDING #8. IN CONJUNCTION WITH THIS DUMPSTER, ALSO ADDED STAIRS AND A RETAINING WALL. REVISED GRADING TO ACCOMMODATE DUMPSTER AND WALL (FIRST SUBMITTAL.)
- ADDED A PRIVATE 6" FIRE LINE, A DETECTOR CHECK VALVE ASSEMBLY AND A POST INDICATOR VALVE TO BUILDING #8 AND A 4" LINE TO A FIRE SERVICE CONNECTION. ALSO ADDED A NOTE RELATIVE TO THE BACKFLOW PREVENTION AT BUILDING #8. A 4" LINE IS SHOWN ON THE SEWER LINE PROFILE ON SHEET 14. (SECOND SUBMITTAL)
- ADDED A MONUMENT SIGN AT THE FRONT OF THE SITE (SOUTHEAST SIDE) (FIRST SUBMITTAL.)
- REMOVED THE SMALL BUILDING ADJACENT TO THE SOUTH SIDE OF BUILDING #1 (FIRST SUBMITTAL.)
- ADJUSTED FIRE LINE, SANITARY SEWER LATERAL AND WATER SERVICE LINE TO BETTER SERVE BUILDING 1 & 2 (FIRST SUBMITTAL.)
- ADDED NOTES TO THE COVER SHEET REGARDING REVIEW OF PLANS BY THE JAMES CITY COUNTY PLANNING COMMISSION AND THE NEW TOWN DESIGN REVIEW BOARD (SECOND SUBMITTAL.)
- ADDED 10" ROOF LEADER OUTFALL PIPES UNDER FIRST SUBMITTAL OF SITE PLAN AMMENDMENT. REMOVED THESE OUTFALL PIPES PRIOR TO SECOND SUBMITTAL. THE ROOF LEADERS WILL NOW DRAIN TO THE SURFACE IN A NON ERODIBLE MANNER.
- ADDED PRIVATE STORM DRAINAGE EASEMENTS TO THE PLANS FOR ALL MAJOR STORM SEWER CONVEYING WATER ACROSS THE SITE TO THE BMP (SECOND SUBMITTAL) ALSO INCLUDED THE NATURAL OPEN SPACE EASEMENTS ON SHEETS 3, 4 AND 6 (SECOND SUBMITTAL)
- MODIFIED OUTFALL STONE AT BMP FROM CLASS A1 RIPRAP TO CLASS 1 RIPRAP (SECOND SUBMITTAL.)
- ADDED INTERNAL PROPERTY LINES TO SHEETS 2, 3, 5, 6, & 7 (SECOND SUBMITTAL)
- ADDED A POST INDICATOR VALVE TO THE 8" FIRE SERVICE WATERLINE TO THE MAINTENANCE BUILDING AT THE REAR (NORTH SIDE) OF THE SITE (SECOND SUBMITTAL)

### INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	COVER SHEET
2	ENVIRONMENTAL INVENTORY PLAN
3	OVERALL SITE LAYOUT PLAN
4	OVERALL UTILITY PLAN
5	SITE AND UTILITY PLAN
6	SITE AND UTILITY PLAN
7	SITE AND UTILITY PLAN
8	BMP POND AS-BUILT
9	GRADING, DRAINAGE, AND E&S PLAN
10	GRADING, DRAINAGE, AND E&S PLAN
11	ROAD PLAN
12	EROSION & SEDIMENT CONTROL PLAN-PHASE I
13	WATER & SEWER PROFILES
14	WATER & SEWER PROFILES
15	WATER LINE PROFILES
16	NOTES & DETAILS
17	NOTES & DETAILS
18	BMP NOTES & DETAILS
19	LIGHTING PLAN

### OWNER INFORMATION:

C.C. CASEY, LTD. CO.  
721 RICHMOND ROAD  
WILLIAMSBURG, VIRGINIA. 23185-3541  
TELEPHONE: (757) 229-3702

### DEVELOPER INFORMATION:

SLN WILLIAMSBURG ASSOCIATES, L.L.C.  
9211 FOREST HILL AVENUE, SUITE 110  
RICHMOND, VIRGINIA. 23235  
CONTACT: JIM GRESOCK  
TELEPHONE: (804) 320-7600  
FAX: (804) 330-8924

### CERTIFIED RESPONSIBLE LAND DISTURBER:

AES CONSULTING ENGINEERS  
5248 OLDE TOWNE ROAD, SUITE 1  
WILLIAMSBURG, VIRGINIA. 23188  
TELEPHONE: 757-253-0040

### SITE DATA:

TAX MAP PARCEL No.	(38-3)(1-02), (38-3)(1-34), (38-3)(1-07)
ZONING:	(38-3)(1-05), (38-3)(1-08), (38-3)(1-08) MU (MIXED USE) WITH PROFFERS
TOTAL PROJECT AREA:	1,369,671 S.F.± 31.44 AC.± 100.00 %
IMPERVIOUS AREA:	15.53 AC 49.40 %
GREEN SPACE:	15.91 AC 50.60 %
DISTURBED AREA:	1,087,693 S.F.± 24.97 AC.±
FLOOD HAZARD MAP:	FEMA PANEL NUMBER 510201 0035 B, DATED 2/6/91 NOTE: SITE IS LOCATED IN ZONE 'X' (AREAS DETERMINED TO BE OUTSIDE THE 500 YEAR FLOOD PLAIN)
COUNTY WATERSHED:	THIS PROJECT IS SITUATED IN SUBWATERSHEDS 209 AND 210. COUNTY CATCHMENTS ARE 209-101-1 AND 210-202-1 OF THE POWHATAN CREEK WATERSHED.

NOTE:  
THIS PLAN WAS REVIEWED ON FEBRUARY 2, 2004  
BY JAMES CITY COUNTY PLANNING COMMISSION IN ACCORDANCE  
WITH SECTION 24-147 (a)(1)(d) OF ZONING ORDINANCE

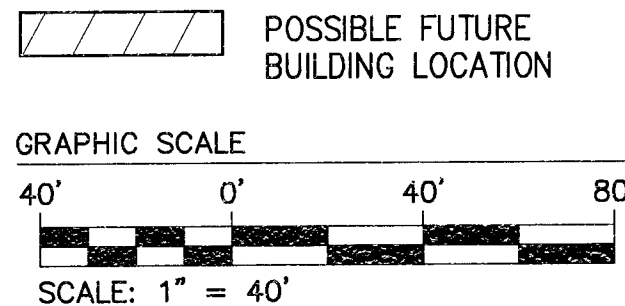
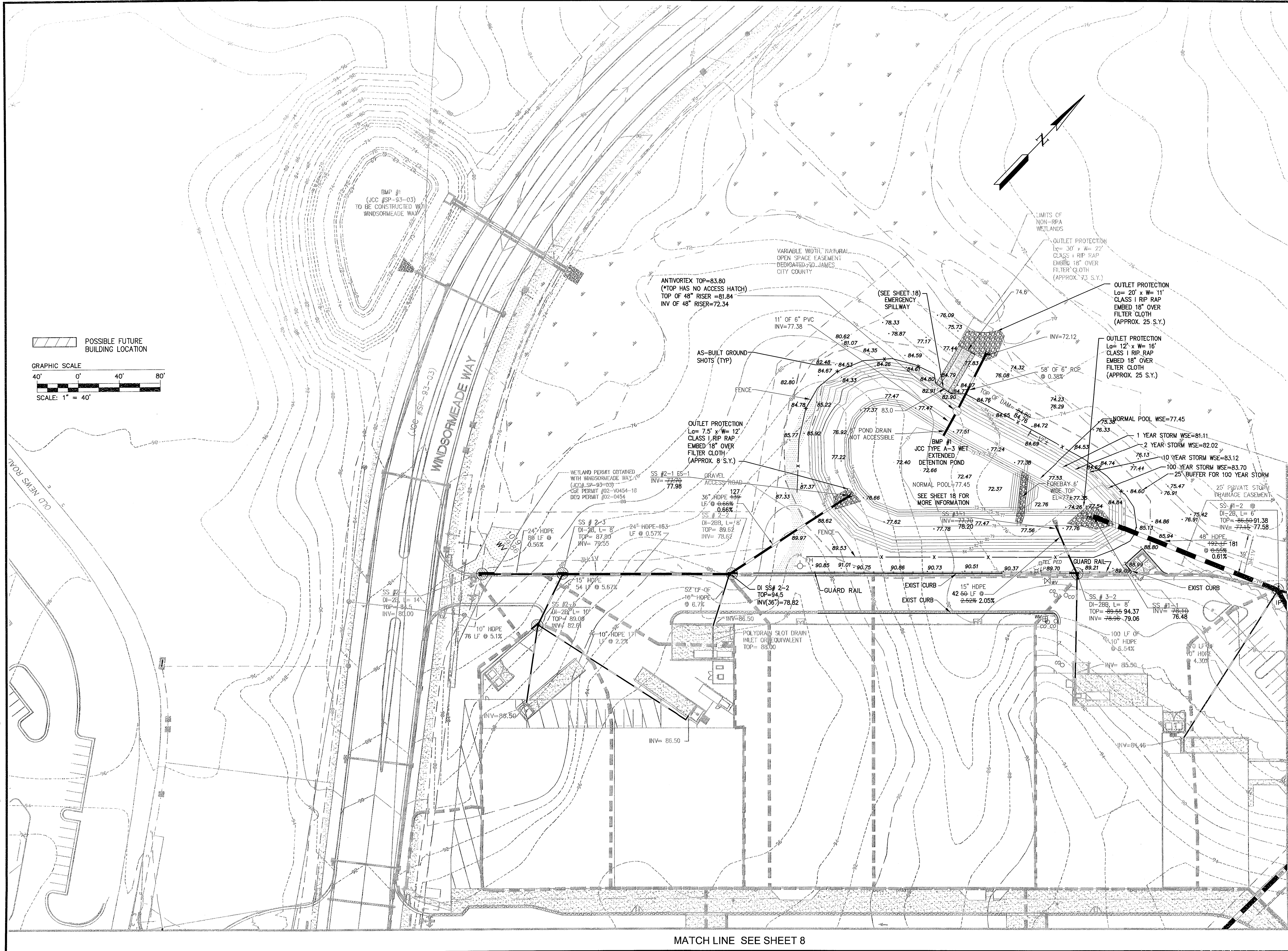
NOTE:  
THE PROPOSED AMENDMENTS OF THIS PLAN WERE REVIEWED  
BY THE NEW TOWN DESIGN REVIEW BOARD AT A MEETING ON  
12/16/04

RECORD DRAWING.: 3/1/2006

No.	DATE	REVISION / COMMENT / NOTE	BY
4	4/28/05	REVISION TO SITE PLAN AMENDMENT	AES
5	1/12/05	SITE PLAN AMENDMENT	AES
5	10/25/04	REVISED COUNTY COMMENTS	AES
4	10/11/04	REVISED COUNTY COMMENTS	AES
3	09/15/04	REVISED COUNTY COMMENTS	AES
2	07/09/04	ADDRESSED COUNTY COMMENTS	AES
1	04/09/04	ADDRESSED COUNTY COMMENTS	AES



S:\Jobs\9069\07-BMP AS-BUILT.dwg Sur\Record Dwg\906902R09-GRAD&DRAIN.DWG 3/1/2006 10:54:38 AM EST

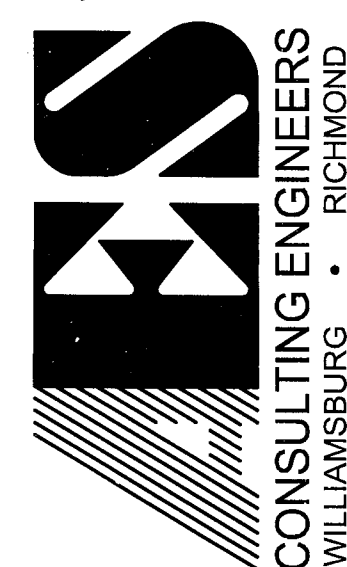


MATCH LINE SEE SHEET 8

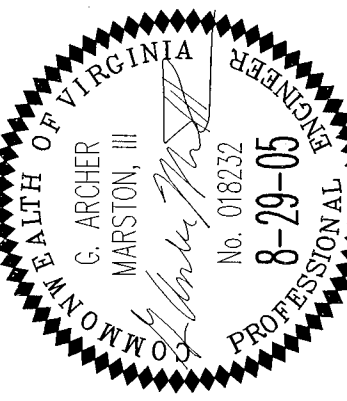
MATCH LINE SEE SHEET 10

Designed	AES	Drawn	MEG
Scale	1"=40'	Date	03/02/06
Project No.	9069-02		
Drawing No.	9		

BMP AS-BUILT  
WINDSORMEADE MARKETPLACE  
BERKELEY DISTRICT  
JAMES CITY COUNTY  
VIRGINIA



5248 Old Towne Road, Suite 1  
Williamsburg, Virginia 23188  
(757) 253-0040  
Fax (757) 220-8994



REVISION TO SITE PLAN AMENDMENT	4-28-05	NO.	4-28-05
SITE PLAN AMENDMENT	1-12-05	NO.	1-12-05
REVISED COUNTY COMMENTS	10-25-04	NO.	10-25-04
REVISED COUNTY COMMENTS	10-11-04	NO.	10-11-04
REVISED COUNTY COMMENTS	9-15-04	NO.	9-15-04
REVISED COUNTY COMMENTS	7-9-04	NO.	7-9-04
ADDRESS/REVISION COMMENTS	4-28-04	NO.	4-28-04

RECORD DRAWING.: 3/1/2006



RECORD DRAWING : 3/1/2006



# WindsorMeade Market Place

## BMP RECORD DRAWINGS

### LEGEND

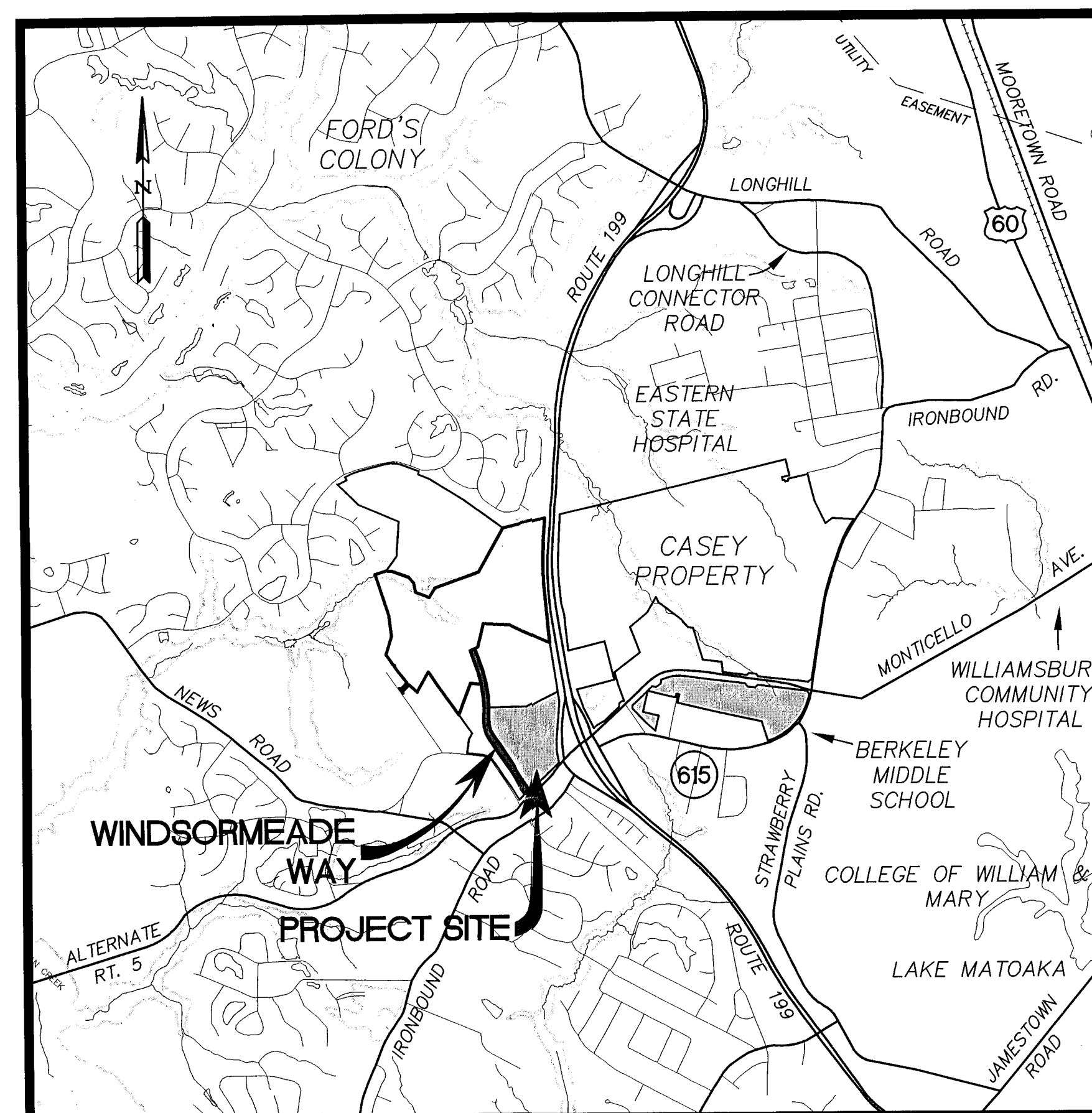
PROPOSED		PROPOSED	
WATER	W	BLOW-OFF ASSEMBLY	d
GRAVITY SEWER	S	CLEAN OUT	—
GRAVITY SEWER (BY OTHERS)	S	WATER METER	—
STORM SEWER	—	CENTERLINE/BASELINE	—
FORCE MAIN	F.M.	RIGHT OF WAY	—
MANHOLE	—	PROPERTY LINE	—
CURB DROP INLET	—	DITCH/SWALE	—
YARD DROP INLET	—	TREELINE	FG25.1
VALVE	—	GROUND ELEVATION	80
FIRE HYDRANT ASSEMBLY	—	EXISTING CONTOUR ELEV.	—

### NOTES:

- THE SITE IS CURRENTLY ZONED MIXED USE WITH PROFFERS. FOR PROFFERS REFERENCE JCC CASE NO. Z-03-01 AND MP-02-97 AND CASE NO. Z-05-03 AND MP-06-03 APPROVED BY THE BOARD OF SUPERVISORS ON DECEMBER 11, 2001.
- CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING 'MISS UTILITY' FOR EXISTING UTILITY LOCATIONS PRIOR TO COMMENCING CONSTRUCTION.
- CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF CONSTRUCTION EFFORTS WITH THE VIRGINIA POWER COMPANY, VERIZON TELEPHONE, APPROPRIATE CABLE COMPANY AND OTHERS THAT MAY BE REQUIRED.
- THE CONTRACTOR SHALL SATISFY HIMSELF AS TO ALL SITE CONDITIONS PRIOR TO CONSTRUCTION.
- THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS PRIOR TO COMMENCEMENT OF WORK TO INCLUDE, BUT NOT LIMITED TO, JAMES CITY COUNTY LAND DISTURBANCE, VDOT LAND USE PERMIT, AND ANY DEMOLITION PERMITS.
- EXISTING UTILITY LOCATIONS INDICATED ARE APPROXIMATE. FIELD VERIFY PRIOR TO COMMENCING THE WORK.
- ALL UTILITIES WILL BE PLACED UNDERGROUND.
- JCSA SHALL BE GRANTED ACCESS EASEMENTS TO WATER AND SEWER LOCATED WITHIN PRIVATE RIGHT-OF-WAYS.
- A PRECONSTRUCTION CONFERENCE SHALL BE HELD ON-SITE BETWEEN THE COUNTY, THE PROJECT ENGINEERS AND THE CONTRACTOR PRIOR TO ISSUANCE OF A LAND DISTURBING PERMIT.
- ALL SANITARY SEWER AND WATER DISTRIBUTION FACILITIES MUST HAVE A MINIMUM HORIZONTAL SEPARATION DISTANCE OF 5' BETWEEN IT AND ALL OTHER FIXED STRUCTURES SUCH AS: DROP INLETS, LIGHT POLES, STORM SEWER PIPES, ETC.
- THE CONTRACTOR IS REQUIRED TO SECURE ALL NECESSARY PERMITS FOR THE ABANDONMENT OR DEMOLITION OF ALL EXISTING WELLS/WATERLINES AND SEPTIC FIELDS IN ACCORDANCE WITH JAMES CITY COUNTY VIRGINIA DEPARTMENT OF HEALTH REGULATIONS. CONTACT VIRGINIA DEPARTMENT OF HEALTH AT 757-253-4813.
- VERIFY ALL DIMENSIONS AND NOTIFY JAMES CITY SERVICE AUTHORITY PRIOR TO ANY EXCAVATION OR DEMOLITION WITHIN UTILITY CORRIDORS.
- PARKING SPACES SHALL BE DELINEATED BY PAVEMENT STRIPING. HANDICAP PARKING. SPACES SHALL BE DESIGNATED BY ABOVE GROUND SIGNS PER USBC REQUIREMENTS.
- THE TOPOGRAPHIC DATA REPRESENTED ON THIS DRAWING IS SUPPLIED BY OWNER/DEVELOPER. CONTOUR INTERVAL = 2 FEET.
- ALL SECURITY LIGHTING IS TO BE LOCATED A MINIMUM OF 10' OFF THE EDGE OF PAVEMENT AND SHALL NOTE BE POSITIONED IN DITCH LINES.
- ALL COMPONENTS OF THE WATER DISTRIBUTION AND SANITARY SEWER SYSTEM SHALL BE INSTALLED AND TESTED IN ACCORDANCE WITH THE LATEST EDITION OF THE AUTHORITY STANDARDS AND SPECIFICATIONS FOR WATER DISTRIBUTION AND SANITARY SEWER SYSTEMS, THE HRPDC REGIONAL STANDARDS, AND THE COMMONWEALTH OF VIRGINIA WATERWORKS AND SEWERAGE REGULATIONS. THE CONTRACTOR SHALL USE ONLY NEW MATERIALS, PARTS AND PRODUCTS ON ALL PROJECTS. ALL MATERIALS SHALL BE STORED SO AS TO ASSURE THE PRESERVATION OF THEIR QUALITY AND FITNESS FOR THE WORK. A COPY OF THE JCSA STANDARDS AND REGIONAL STANDARDS MUST BE KEPT ON-SITE BY THE CONTRACTOR DURING THE FULL TIME OF INSTALLING, TESTING, AND CONVEYING THE FACILITIES TO JCSA.
- STORM STRUCTURES, SEWER AND BEDDING SHALL CONFORM TO THE VDOT ROAD AND BRIDGE STANDARDS AND VDOT SPECIFICATIONS. ALL PIPE BEDDING SHALL BE IN ACCORDANCE WITH PB-1 AND MANUFACTURER SPECS. AND GUIDELINES, AND MANHOLES DEEPER THAN 4 FEET SHALL HAVE STEPS (ST-1). ALL REINFORCED CONCRETE PIPE (RCP) SHALL BE CLASS III UNLESS OTHERWISE NOTED. STORM SEWER OUTSIDE OF VDOT R.O.W. CAN BE HIGH DENSITY POLYETHYLENE (HDPE).
- ALL EXISTING STRUCTURES LOCATED ON THE SITE ARE TO BE DEMOLISHED AND WILL REQUIRE A DEMOLITION PERMIT. THIS PERMIT CAN BE ACQUIRED FROM THE JAMES CITY COUNTY CODE COMPLIANCE DEPARTMENT TELEPHONE NUMBER: 757-253-6826.
- NO TREES, SHRUBS, FENCES OR OBSTACLES SHALL BE PLACED WITHIN A JCSA EASEMENT WHICH WOULD RENDER THE EASEMENT INACCESSIBLE BY EQUIPMENT. SHRUBS SHALL BE A MINIMUM OF 5 FEET, AND TREES A MINIMUM OF 10 FEET, FROM THE CENTER OF WATER AND SEWER PIPELINES.
- CONTACT MR. SAL SIBILIA 72 HOURS IN ADVANCE OF ALL PAVEMENT MARKINGS/SIGN INSTALLATIONS AT (757) 925-1679.
- ALL SIGNAGE SHALL BE IN ACCORDANCE WITH ARTICLE II, DIVISION 3 OF THE JAMES CITY COUNTY ZONING ORDINANCE.
- OUTSIDE SALES AND STORAGE OF MERCHANDISE IS PROHIBITED.
- HVAC EQUIPMENT AND OTHER UTILITIES, DOWNSPOUTS, AND GUTTERS SHALL BE PAINTED TO MATCH THE EXTERIOR COLOR OF THE BUILDING SURFACE MATERIAL COLOR. BASES OF THE LIGHT POLES SHOULD BE PINTED TO MATCH THE COLOR OF THE POLES.
- ONLY JCSA PERSONNEL ARE AUTHORIZED TO OPERATE VALVES ON EISTING JCSA WATER MAIN.
- WATER METERS MUST BE LOCATED A MINIMUM OF 2' FROM SIDEWALKS AND BACK OF CURBS AND 18" FROM EDGE OF DRIVEWAYS.
- THE OWNER SHALL IMPLEMENT AN ANNUAL PERFORMANCE EVALUATION/INSPECTION OF THE BACKFLOW PREVENTION DEVICE AND COORDINATE WITH JOHN WILSON, JCSA UTILITY SPECIAL COORDINATOR, AT (757) 259-4138. THE BACKFLOW PREVENTER SHALL BE TESTED, MAINTAINED, AND OPERATED IN ACCORDANCE WITH JCSA STANDARDS.

JCC# SP-2-05  
AMENDMENT TO JCC# SP-150-03

JAMES CITY COUNTY, VIRGINIA



VICINITY MAP  
SCALE: 1"=2000'

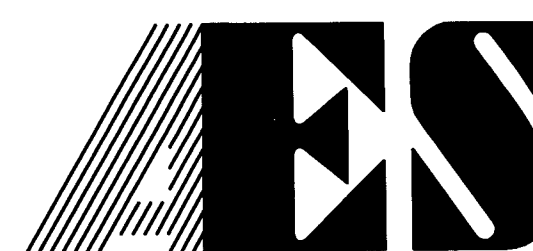
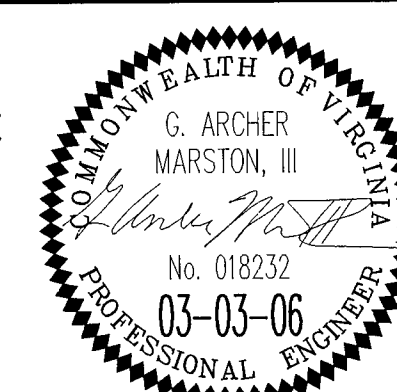
DECEMBER 29, 2003

PROJECT NO.: 9069-02

SITE PLAN AMENDMENT: 1-12-05

"THE SANITARY SEWER, WATER, AND DRAINAGE STRUCTURE LOCATIONS AND GRADES SHOWN ON THESE DRAWINGS, ARE ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF AND I CERTIFY THAT I, OR MY AGENT, HAVE MADE SUFFICIENT INSPECTION TO ENSURE THE ACCURACY OF THIS STATEMENT."

ARCHER G. MARSTON III DATE



CONSULTING ENGINEERS  
WILLIAMSBURG • RICHMOND

5248 Olde Towne Road, Suite 1  
Williamsburg, Virginia 23188  
(757) 253-0040  
Fax (757) 220-8994

SITE PLAN AMENDMENT (AMENDMENT TO SP #150-03, APPROVED NOVEMBER 12, 2004)  
THE FOLLOWING IS A DESCRIPTION OF THE REVISIONS MADE TO THE PLAN UNDER THE SITE PLAN AMENDMENT AND THE RESUBMITTAL ADDRESSING COUNTY COMMENTS:

- REVISED FOOTPRINT OF BUILDING #5. ADDED A SANITARY LATERAL FOR THIS BUILDING. REVISED RELATIVE "REQUIRED" PARKING COUNTS. GRADING IN THIS AREA WAS ADJUSTED TO ACCOMMODATE NEW FOOTPRINT (FIRST SUBMITTAL). ADJUSTED 10" LOADING DOCK OUTFALL ON PLANS AND ON WATERLINE PROFILE "D" AND SANITARY PROFILE MH#7 TO MH#3 (SECOND SUBMITTAL).
- ADDED DUMPSTER SOUTH OF BUILDING #8. IN CONJUNCTION WITH THIS DUMPSTER, ALSO ADDED STAIRS AND A RETAINING WALL. REVISED GRADING TO ACCOMMODATE DUMPSTER AND WALL (FIRST SUBMITTAL).
- ADDED A PRIVATE 6" FIRE LINE, A DETECTOR CHECK VALVE ASSEMBLY AND A POST INDICATOR VALVE TO BUILDING #8 AND A 4" LINE TO A FIRE SERVICE CONNECTION. ALSO ADDED A NOTE RELATIVE TO THE BACKFLOW PREVENTION AT BUILDING #8. A 4" LINE IS SHOWN ON THE SEWER LINE PROFILE ON SHEET 14. (SECOND SUBMITTAL)
- ADDED A MONUMENT SIGN AT THE FRONT OF THE SITE (SOUTHEAST SIDE) (FIRST SUBMITTAL)
- REMOVED THE SMALL BUILDING ADJACENT TO THE SOUTH SIDE OF BUILDING #1 (FIRST SUBMITTAL)
- ADJUSTED FIRE LINE, SANITARY SEWER LATERAL AND WATER SERVICE LINE TO BETTER SERVE BUILDING 1 & 2 (FIRST SUBMITTAL)
- ADDED NOTES TO THE COVER SHEET REGARDING REVIEW OF PLANS BY THE JAMES CITY COUNTY PLANNING COMMISSION AND THE NEW TOWN DESIGN REVIEW BOARD (SECOND SUBMITTAL)
- ADDED 10" ROOF LEADER OUTFALL PIPES UNDER FIRST SUBMITTAL OF SITE PLAN AMENDMENT. REMOVED THESE OUTFALL PIPES PRIOR TO SECOND SUBMITTAL. THE ROOF LEADERS WILL NOW DRAIN TO THE SURFACE IN A NON ERODIBLE MANNER.
- ADDED PRIVATE STORM DRAINAGE EASEMENTS TO THE PLANS FOR ALL MAJOR STORM SEWER CONVEYING WATER ACROSS THE SITE TO THE BMP (SECOND SUBMITTAL) ALSO INCLUDED THE NATURAL OPEN SPACE EASEMENTS ON SHEETS 3, 4 AND 6 (SECOND SUBMITTAL)
- MODIFIED OUTFALL STONE AT BMP FROM CLASS A1 RIPRAP TO CLASS 1 RIPRAP (SECOND SUBMITTAL)
- ADDED INTERNAL PROPERTY LINES TO SHEETS 2, 3, 5, 6, & 7 (SECOND SUBMITTAL)
- ADDED A POST INDICATOR VALVE TO THE 8" FIRE SERVICE WATERLINE TO THE MAINTENANCE BUILDING AT THE REAR (NORTH SIDE) OF THE SITE (SECOND SUBMITTAL)

### INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	COVER SHEET
2	ENVIRONMENTAL INVENTORY PLAN
3	OVERALL SITE LAYOUT PLAN
4	OVERALL UTILITY PLAN
5	SITE AND UTILITY PLAN
6	SITE AND UTILITY PLAN
7	SITE AND UTILITY PLAN
8	BMP POND AS-BUILT
9	GRADING, DRAINAGE, AND E&S PLAN
10	ROAD PLAN
11	EROSION & SEDIMENT CONTROL PLAN-PHASE I
12	WATER & SEWER PROFILES
13	WATER & SEWER PROFILES
14	WATER LINE PROFILES
15	NOTES & DETAILS
16	NOTES & DETAILS
17	BMP NOTES & DETAILS
18	LIGHTING PLAN
19	

### OWNER INFORMATION:

C.C. CASEY, LTD. CO.  
721 RICHMOND ROAD  
WILLIAMSBURG, VIRGINIA 23185-3541  
TELEPHONE: (757) 229-3702

### DEVELOPER INFORMATION:

SLN WILLIAMSBURG ASSOCIATES, L.L.C.  
9211 FOREST HILL AVENUE, SUITE 110  
RICHMOND, VIRGINIA 23235  
CONTACT: JIM GRESOCK  
TELEPHONE: (804) 320-7600  
FAX: (804) 330-8924

### CERTIFIED RESPONSIBLE LAND DISTURBER:

AES CONSULTING ENGINEERS  
5248 OLDE TOWNE ROAD, SUITE 1  
WILLIAMSBURG, VIRGINIA 23188  
TELEPHONE: 757-253-0040

### SITE DATA:

TAX MAP PARCEL No.	(38-3)(1-02), (38-3)(1-34), (38-3)(1-07)
ZONING:	(38-3)(1-05), (38-3)(1-06), (38-3)(1-08) MU (MIXED USE) WITH PROFFERS
TOTAL PROJECT AREA:	1,369,671 S.F.± 31.44 AC.± 100.00 %
IMPERVIOUS AREA:	15.53 AC 49.40 %
GREEN SPACE:	15.91 AC 50.60 %
DISTURBED AREA:	1,087,693 S.F.± 24.97 AC.±
FLOOD HAZARD MAP:	FEMA PANEL NUMBER 510201 0035 B, DATED 2/6/91 NOTE: SITE IS LOCATED IN ZONE "X" (AREAS DETERMINED TO BE OUTSIDE THE 500 YEAR FLOOD PLAIN)
COUNTY WATERSHED:	THIS PROJECT IS SITUATED IN SUBWATERSHEDS 209 AND 210. COUNTY CATCHMENTS ARE 209-101-1 AND 210-202-1 OF THE POWHATAN CREEK WATERSHED.

NOTE:  
THIS PLAN WAS REVIEWED ON FEBRUARY 2, 2004  
BY JAMES CITY COUNTY PLANNING COMMISSION IN ACCORDANCE  
WITH SECTION 24-147 (a)(1)(d) OF ZONING ORDINANCE

NOTE:  
THE PROPOSED AMENDMENTS OF THIS PLAN WERE REVIEWED  
BY THE NEW TOWN DESIGN REVIEW BOARD AT A MEETING ON  
12/16/04

RECORD DRAWING: 3/1/2006

No.	DATE	REVISION / COMMENT / NOTE	BY
1	4/28/05	REVISION TO SITE PLAN AMENDMENT	AES
2	1/12/05	SITE PLAN AMENDMENT	AES
3	10/25/04	REVISED COUNTY COMMENTS	AES
4	10/11/04	REVISED COUNTY COMMENTS	AES
5	09/15/04	REVISED COUNTY COMMENTS	AES
6	07/09/04	ADDRESSED COUNTY COMMENTS	AES
7	04/09/04	ADDRESSED COUNTY COMMENTS	AES